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May 2012

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Certifies that this is the approved version of the following thesis:**

**Current Regulations, Scientific Research, and District Rulemaking
Processes to Protect and Conserve the Carrizo-Wilcox Aquifer in Texas
by Groundwater Conservation Districts**

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by

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Thesis

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Dedication

This thesis is dedicated to my grandparents, Gustav and Rose Heidemann; may they continue to rest peacefully at Fort Bliss National Cemetery, El Paso, Texas. I am eternally grateful to my grandparents for inspiring me to move to Texas to earn my college education.

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Abstract

Current Regulations, Scientific Research, and District Rulemaking Processes to Protect and Conserve the Carrizo-Wilcox Aquifer in Texas by Groundwater Conservation Districts

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The University of Texas at Austin, 2012

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Groundwater is critical in Texas, representing 60 percent of total water used in 2008. Water demands in Texas are projected to increase 22 percent, largely from an almost doubling of population, within the next 50 years; this ever-increasing pressure on Texas water supplies underscores the need to optimize management of water resources. The objective of this study was to assess regulations, scientific information, and rulemaking by groundwater conservation districts (GCDs) which support policies that achieve the legislative intent of GCDs to protect and conserve groundwater resources of the states aquifers. This study's scope was the Carrizo-Wilcox Aquifer and managing GCDs and the following key topics were evaluated 1) management and protection issues; 2) if and how GCDs are utilizing science in development of management plans and rules; 3) whether GCDs are implementing management plans and using enforcement actions; 4) determining if GCDs would have production budgets in conflict with the Regional and State Water Plan and use of the aquifer; 5) and comparing the management plans of GCDs for compatibility. Two online surveys were developed to solicit responses from

GCDs and interested parties. Results show that the predominant management issues stemmed from the uncertainty in how groundwater production was regulated and how future permitting would proceed. Environmental interest groups were concerned that GCDs would not adequately incorporate science that supports groundwater production budgets. Stakeholder groups perceived groundwater conservation management as adversely impacting their individual property rights and their region's ability to develop water management strategies that address projected water budgets. Few formal enforcement actions have been taken by GCDs since 2007. Current water budgets and desired future conditions by the GCDs for the Carrizo-Wilcox Aquifer do not conflict or result in long-term deficits with respect to water budget projections established by the 2011 Regional Water Plans. GCDs adopted groundwater management plans that addressed goals including conservation and recharge, as outlined in the Texas Water Code, by creating varied objectives and standards. Unanimous public acceptance of the management plans and rules established by the GCDs may never be accomplished, but acceptance will improve through the continuation of public communication, stakeholder coordination, and education.

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Introduction

Texas has experienced considerable economic development and population growth over the past several decades, prompting local governments to establish various entities to manage water resources. Throughout Texas, landowners and municipalities have depended on groundwater as a primary water resource because of local availability and quality. Groundwater conservation, protection, and ownership are controversial issues among water user groups in Texas. According to the 2012 Texas State Water Plan (SWP), published by the Texas Water Development Board (TWDB), groundwater represents 60 percent of the total water used statewide. Further, the SWP reports that population will nearly double, from roughly 25 million to 46 million people, and demand for water will increase by 22 percent for the same time period (TWDB, 2012). Currently, development pressures for Texas are projected across the state; this study focused on a corridor that extends from the southwest to the northeast section of the state, which overlies a major aquifer known as the Carrizo-Wilcox Aquifer. Development pressure for both surface water and groundwater resources has prompted the citizens of Texas to adopt a water management structure to aide in the development and implementation of water management strategies. This structure includes Regional Water Planning Groups (RWPGs), Groundwater Management Areas (GMAs), and Groundwater Conservation Districts (GCDs) that are responsible for the research and development of plans and best-management practices within the state. Stakeholders throughout Texas acknowledge that planners must diversify existing local and regional water resource portfolios in a manner that will protect local populations and economies from excessive water restrictions in times of protracted drought and from the degradation water resources. The objective of this study was to evaluate the foundation of

regulations, scientific information, and groundwater conservation district rulemaking that supports policies that achieve the legislative intent of GCDs to protect and conserve groundwater resources of the Carrizo-Wilcox Aquifer.

The Texas Legislature provides communities, under Chapter §36.0015 of the Texas Water Code, with the authority to establish GCDs. GCDs are political subdivisions with boards of directors that are either elected by the public at large or appointed by other entities including but not limited to commissioners courts. These GCDs are the state's "preferred method of groundwater management" and are responsible for developing, adopting, and promulgating rules (TWC§36.0015). However, economic pressures and property-right disputes have created tension between some GCDs and landowners because of rules that boards have adopted that restrict, or have the potential to restrict, groundwater production. Many landowner associations argue Texas law guarantees a landowner complete ownership and control of the water beneath their property under the "rule of capture"(TWDB, 2012). And therefore any form of groundwater production regulation or omnibus budgeting is perceived as a direct infringement upon a landowner's property rights.

To continue, the establishment and implementation of Desired Future Conditions (DFCs) by the GCDs and Groundwater Management Areas have contributed to disagreements among GCDs within the same GMA. Disagreements largely stem from the estimation of available groundwater and production budgets. Most GCDs have adopted a conservative approach to production goals and estimates; however, there are GCDs that have established goals that may deplete local and regional groundwater from the Carrizo-Wilcox Aquifer at a greater rate. The Texas Water Code requires the TWDB to provide Groundwater Availability Models (GAMs)

and other science that is required to be considered by the boards of local GCDs during the development of groundwater management plans and the rules.

To continue, a few terms should be explained to the reader for this discourse to develop further. Desired future conditions (DFCs), under the Texas Water Code (TWC), represents a stakeholder and agency water-budgeting process that accepts estimated aquifer drawdown and is aimed at ensuring spring flow during droughts and supports environmental base flows over a 50-year planning period. Per TWC §36.108, GCDs are required to review DFCs every five years. GCDs can obtain and utilize GAMS from the TWDB to aid in planning and development of management plans. GCDs and RWPGs were designed with the intent of fostering a bottom-up management approach, allowing for the local interpretation of the models with the intention of addressing water management strategies indicated by the SWP, which is released every five years. The TWDB delineates and designates GMAs and is responsible for providing financial and technical assistance to the GMAs and GCDs. Further, the establishment of DFCs are of serious concern for all stakeholders because the DFCs adopted by the GCDs and GMAs are the foundation for the MAGS that the TWDB utilizes, and, in turn, use in the SWP and the regional water planning process. Per TWC §36.1083 the TWDB may only recommend changes to DFCS adopted by the GCDs and GMAs when a petition is filed by a person with legal interest in the management area or region. The TWDB is then permitted to review a GCD's established DFC and make recommendations, which the GCD may utilize when making revisions to the management plan and DFC. The TWDB is not granted the authority to overrule GCD decisions and can only provide an avenue to hear petitions and to make recommendations. The TWC currently enables GCDs, even after a formal hearing, to reject the TWDB recommendations

during the review period. This study found that numerous stakeholder groups, including ranchers, farmers, the energy sector, land developers, and private and public water purveyors raised concerns that the GCDs' management of the DFC process may adversely impact their groundwater rights and their region's ability to exercise strategies described in the SWP. It is important to emphasize that the TWDB is not a regulatory agency and the TWDB's primary scope includes planning, research, and serving as an advisory resource for agencies and local governments. The TWDB may only provide recommendations or testimony to the legislature and the courts, unlike the Texas Commission on Environmental Quality, which possesses regulatory authority.

Over the next 50 years, GCDs will continue to experience development pressures from expanding suburban areas that surround or include the cities of Houston, Austin, San Antonio, and other communities located southward to the Mexican border. San Antonio is currently the state's fastest growing metropolitan area. Due to San Antonio's growth, the city's leadership has had to diversify and invest in alternative groundwater resources and technologies, as there is limited access to traditionally utilized water resources including those governed by, but not limited to, the Lower Colorado River Authority and the Edwards Aquifer Authority. For instance, the San Antonio Water System (SAWS), the predominant water purveyor for the city of San Antonio, has developed, and will continue to develop, groundwater from the Carrizo-Wilcox Aquifer in southern Bexar County and northern Atascosa County. Other water user groups that have stimulated renewed interest in the Carrizo-Wilcox Aquifer include the energy sector, particularly companies engaged in development of oil and gas resources such as the Eagle Ford Shale and Haynesville Shale. Recent research demonstrates that the ratio of groundwater to

surface utilized in shale wells hydraulically fractured varies from region to region. Wells completed in the Eagle Ford Shale utilized about 18 percent groundwater whereas those wells completed in the Haynesville shale in Texas utilized about 38 percent groundwater (Nicot and Scanlon, 2012). Texas code enables the Railroad Commission of Texas to issue exempt use permits for water production wells used in the development of oil and/or gas wells. On average, oil and gas in Texas operations utilize 1.5-3 million gallons of water per horizontal well drilled and hydraulically fractured, but these estimates are largely dependent upon the length and number of stages in the well design for a given formation. Shale gas water use represents less than one percent of total water consumption in Texas (Nicot and Scanlon, 2012). TWDB estimated that in 2008 about 35.8 thousand acre feet of water was used for hydraulic fracturing (TWDB, 2012). As the Texas economy continues to grow, so will the projected demand for water, despite modest improvements in water-use efficiencies for agriculture, manufacturing, and residential water use.

The objective of this study was to evaluate the foundation of regulations, scientific information, and GCD rulemaking that support policies that achieve the legislative intent of GCDS to protect and conserve groundwater resources of the Carrizo-Wilcox Aquifer. This study consisted of five chapters that evaluated the following key topics: 1) predominant management and protection issues 2) how and if groundwater conservation districts were utilizing groundwater science in the development process of management plans and rules 3) whether groundwater conservation districts were implementing management plans and using enforcement actions 4) determine if groundwater conservation districts in the Carrizo-Wilcox Aquifer would have production budgets that would be in conflict with the Regional and State Water Plan and

use of the aquifer 5) and characterize and compare the management plans of groundwater conservation districts for compatibility. Two online surveys were developed to solicit responses from groundwater conservation districts and interested parties. Preliminary estimates from the TWDB for the 2012 SWP were acquired to further the goal of evaluating regional and state water planning strategies for managed available groundwater and adopted DFCs.

Chapter 1: Predominant Management or Protection Issues and Concerns from Stakeholders Regarding the Carrizo-Wilcox Aquifer

Chapter 1 describes (1) the final stakeholder groups identified as part of the Texas Commission on Environmental Quality Carrizo-Wilcox study, (2) surveys developed to solicit input from interested parties, including GCDs with jurisdictional responsibilities over the Carrizo-Wilcox Aquifer, regarding predominant management or protection issues and concerns related to the Carrizo-Wilcox Aquifer, and (3) a summary and representative detailed responses to the survey questionnaires. While this chapter contains survey responses from the GCD's survey regarding predominant groundwater management and/or protection issues and concerns, the complete responses to the survey questionnaires are available for review online at <http://igor.beg.utexas.edu/aquiferstudy/QuestionnaireResults.aspx?ID=4>.

1.1 Final Stakeholder List

A significant component of chapter 1 was focused on identifying, contacting, and soliciting feedback from targeted interest groups and individuals directly or indirectly involved with the Carrizo-Wilcox Aquifer. In order to compile and contact potential stakeholders of the Carrizo-Wilcox Aquifer, the following efforts were completed.

- A project website was created at <http://www.beg.utexas.edu/cswr/aquiferstudy/> that contained a link inviting individuals and interested groups to sign up as a stakeholder.
- State agencies, trade and professional organizations such as Texas Alliance of Groundwater Districts, Texas Water Conservation Association, Texas Rural Water Association, and Texas Section American Water Works Association were contacted with requests to post links on the organization's websites advertising the study and the request for stakeholders to participate.

- A list of water user groups with contact information from the 2006 and draft 2011 regional water plans for all regional water planning groups currently using or planning to use the Carrizo-Wilcox Aquifer at any point in the 50-year planning horizon were obtained from the TWDB.
- A list of water users of the Carrizo-Wilcox Aquifer and their contact information that have submitted a water use survey was obtained from the TWDB.
- A variety of sources were used to compile a complete list of all GCDs with jurisdictional responsibilities over the Carrizo-Wilcox Aquifer, including current contact information.
- Sign up lists from a 2009 Carrizo-Wilcox Aquifer Symposium held at Texas A&M University were obtained from the TWDB.

The final stakeholder list contains 517 names, the majority of which include email contact information (see separate electronic attachment). This stakeholder list has been and will continue to be used throughout the course of the study to disseminate results, findings, and information on future meetings.

1.2 Carrizo-Wilcox Study Online Survey Questionnaires

The primary process for soliciting comments from stakeholders of the Carrizo-Wilcox Aquifer was through online surveys developed specifically for this study. Two separate survey questionnaires were developed to solicit focused information from interested parties and from GCDs. Draft surveys were presented to TCEQ staff for review prior to their release. These surveys are presented below

1.3 Interested Parties Survey Questionnaire

The following is the complete Carrizo-Wilcox Aquifer Interested Parties Survey Questionnaire that was posted online:

1. What is the name of your interested organization, if applicable?
2. What is the mailing address for your interested party?
3. What is the phone number for your interested party?
4. What is the email address for the interested party?
5. Provide a brief description of any predominant groundwater management or protection issues and concerns related to the Carrizo-Wilcox Aquifer.
6. Please provide a list, with sufficient detail to allow for an availability analysis, of any new or alternative water management strategies that are being considered for future implementation that may impact groundwater availability in the Carrizo-Wilcox Aquifer, but are not currently in the regional and state water plans.
7. Are you aware of any compatibility issues that have already been documented or that may occur as a result of the implementation of any district's management plan? If yes, please describe the nature of the compatibility issue.
8. Provide a list of any substantial enforcement actions, regardless of ultimate resolution, taken for violations of district rules since September 1, 2007. In as much detail as possible, include the dates, nature of violations, citation to rules violated, enforcement actions taken by the district, resolution actions taken by violators, and dates of compliance.
9. Are you aware of the presence of anthropogenic contaminants in the recharge zone or the production zones of the Carrizo-Wilcox Aquifer? If so, please describe the nature of the contamination (i.e.- contaminant, location, possible sources and supporting analytical data, if available).
10. Are you aware of management gaps or regulatory gaps that have led to or could lead to contamination of the recharge zone or production areas of the Carrizo-Wilcox Aquifer? If so, please describe the management or regulatory gaps related to past, current or potential aquifer contamination.

1.4 Carrizo-Wilcox Aquifer Groundwater Conservation District Survey Questionnaire

Following is the complete Carrizo-Wilcox Aquifer Groundwater Conservation District Survey Questionnaire that was posted online.

1. What is the name of your groundwater conservation district?
2. Who is the primary point of contact, and what is his or her title?
3. What is the physical address of the district's headquarters?
4. What is the mailing address for the district's headquarters?
5. What is the phone number?
6. What is the primary contact email address?
7. On what date was the groundwater conservation district established by the legislature or TCEQ?
8. What is the date of the confirmation election, if applicable?
9. By what method was the district created? (special law, petition, other)
10. If the district's boundaries are based on something other than county boundaries please provide a map of the district's boundaries. (Adobe PDF format preferred)
11. If the district's jurisdictional boundaries are based on political boundaries, please describe what boundaries are included in the district.
12. Provide a brief description of any predominant groundwater management and/or protection issues and concerns related to the Carrizo-Wilcox Aquifer.
13. Provide an electronic copy of the district's current adopted management plan. (Word format preferred)
14. Provide an electronic copy of the district's current adopted rules. (Word format preferred)
15. Provide an electronic copy of any written procedures or guidelines for operational purposes that have been developed and adopted by the district. (Word format preferred)
16. Provide electronic copies of any scientific data, reports, or presentations presented to and considered by the district during development of the current management plan. Include board of directors meeting minutes for any meeting in which the science in question was discussed. (Microsoft Office formats preferred)
17. Provide electronic copies of any scientific reports presented to and considered by the district during the development of the current district rules. Include in this information request electronic copies (Word format preferred) of district board of directors meeting minutes for any meeting during which the science identified was discussed.

18. Provide electronic copies (Word format preferred) of any scientific reports presented to and considered by the district during the development of any procedures that have been adopted by the district. Include in this information request electronic copies (Word format preferred) of district board of directors meeting minutes for any meeting during which the science identified was discussed.
19. Provide a list of all substantial enforcement actions taken for violations of district rules since September 1, 2007. The district should include in this list the dates, nature of violations, citation to rules violated, enforcement actions taken by the district, resolution actions taken by violators, and dates of compliance. (Word format preferred)
20. Provide a list, with sufficient detail to allow for a groundwater availability analysis, any new or alternative water management strategies that are being considered for future implementation that may impact groundwater availability in the Carrizo-Wilcox Aquifer, but are not currently in the regional and state water plans.
21. Summarize significant programs included in the district's management plan specifically designed to conserve and protect the Carrizo-Wilcox Aquifer.
22. Has the district identified any compatibility issues that have already been documented or that may occur as a result of implementation of the district's current management plan and an adjacent district's management plan? If yes, please describe nature of compatibility issue.
23. Within GMA 11, 12, and 13, each groundwater conservation district that has been selected to serve as the administrator for the GMA process is asked to provide electronic copies of minutes from any meetings that have taken place since the beginning of the joint planning process during which scientific data and/or studies have been considered during the development of desired future condition recommendations. Provide electronic copies of any scientific data or presentations considered and identified in the minutes (Word format preferred).
24. Are you aware of the presence of anthropogenic contaminants in the recharge zone or the production zones of the Carrizo-Wilcox Aquifer? If so, please describe the nature of the contamination (i.e.- contaminant, location, possible sources and supporting analytical data, if available).

25. Are you aware of management gaps or regulatory gaps that have led to or could lead to contamination of the recharge zone or production areas of the Carrizo-Wilcox Aquifer? If so, please describe the management or regulatory gaps related to past, current or potential aquifer contamination.

1.5 Summary and Representative Responses to Carrizo-Wilcox Aquifer Study Survey Questionnaire

There are a variety of stakeholders within the Carrizo-Wilcox Aquifer, representing numerous interests such as municipalities, regional water purveyors, environmental interests, private property owners, agriculture, industry, and locally governed GCDs. All identified interests were invited to participate in the study by responding to surveys developed to collect information regarding the Carrizo-Wilcox Aquifer and any predominant groundwater management and protection concerns. The following sections summarize selected responses to the survey questionnaires. For the complete set of responses, the reader is referred to the Carrizo-Wilcox Aquifer Study website at <http://www.beg.utexas.edu/cswr/aquiferstudy/>.

1.6 Interested Parties Responses

There were 65 unique responses received, either directly to the BEG (via email or other correspondence) or through the online Carrizo-Wilcox Aquifer Interested Parties Survey Questionnaire. Questions 1-4 were included to solicit contact information in the event that follow up questions were determined to be warranted.

Question 5 requests that the interested party “*Provide a brief description of any predominant groundwater management or protection issues and concerns related to the Carrizo-Wilcox Aquifer.*” This was the question for which almost all responses were focused. Generally, the responses can be divided into four broad categories:

- Wholesale and retail water providers concerned about the future of groundwater management in the Carrizo-Wilcox Aquifer
- Environmental interests concerned with inadequate focus on environmental protection during adoption of desired future conditions, management plans, and rules by Carrizo-Wilcox GCDs
- Citizens concerned about property rights being violated by the Lost Pines Groundwater Conservation District
- Citizens in Gonzales County concerned about their ability to sell their groundwater due to actions by the Gonzales County GCD. Municipal and private water purveyors survey comments focused on a number of issues related to their ability to continue to provide water supplies to their current and future customers. For example, the San Antonio Water System and the Schertz Seguin Local Government Corporation commented on difficulties they experienced during water supply project implementation due to inconsistencies in the permitting process from one district to another and their inability to obtain long-term commitments for water supply permits. San Antonio Water System commented regarding the variability in local GCD philosophies and rules that *“This regulatory inconsistency adds unnecessary difficulty to both long-term planning for water supply projects, as well as planning for the aquifer on a hydrologic basis.”* Canyon Regional Water Authority commented that the “crisis” in management of the Carrizo-Wilcox Aquifer is not based on actual hydrologic data. Specifically, Canyon Regional Water Authority commented that, *“Over the past several years, public awareness of groundwater issues and concerns over the availability of future supplies has grown dramatically. Fueling much of the anxiety is a fear of the impending “drying up” of*

Texas' aquifers. However, the common perception that we are recklessly "mining" groundwater and that future generations will be left with meager and dwindling supplies is unfounded. On the contrary, the large amount of available hydrogeologic data indicates that the Carrizo-Wilcox aquifers are vast and largely underdeveloped resources that contain enough water to supply all of Central and South Texas' needs for centuries."

The City of Bryan submitted two sets of comments to the study. The following is a portion of these comments, along with recommendations:

"...When Senate Bill 2 passed in 2001, the Texas Water Development Board was directed to 'designate groundwater management areas covering all major and minor aquifers in the state...Each groundwater management area shall be designated with the objective of providing the most suitable area for the management of the groundwater resources. To the extent feasible, the groundwater management area shall coincide with the boundaries of a groundwater reservoir or a subdivision of a groundwater reservoir". (Sec. 35.004, Senate Bill 2, 77th Texas Legislature).

In response to this directive, the Texas Water Development Board designated 16 groundwater management areas, based almost exclusively on the boundaries of major and minor aquifers throughout the state. Recognizing the natural hydrologic divide effect that the Colorado and Trinity rivers have on groundwater flow in this critical groundwater resource, the Carrizo-Wilcox Aquifer, which covers all or parts of more than 60 counties in Texas, was divided into three groundwater management areas.

It is noteworthy to reflect on the directive from the Texas Legislature in 2001, 'Each groundwater management area shall be designated with the objective of providing the most suitable area for the management of the groundwater resources'. If the Carrizo-Wilcox Aquifer is

to be managed as effectively as possible in order to ensure that it remains a high quality, cost-effective, reliable water supply for the citizens of Texas, including the City of Bryan, then the most effective form of groundwater management should be utilized. However, the Carrizo-Wilcox Aquifer is currently managed, in part by 24* groundwater conservation districts, and in other areas, still has no management. (*- reader's note - for this study, it has been determined that there are 21 confirmed GCDs with jurisdictional authority over the Carrizo-Wilcox Aquifer.)

Therefore, the City of Bryan requests;

- Continued legislative review to ensure hydrologically-based management of the Carrizo-Wilcox Aquifer,
- Continued legislative support for financial resources necessary to develop, update, and maintain science necessary to make sound policy and regulatory decisions, and
- Legislative review regarding ownership of groundwater as it relates to investments made by political subdivisions, such as the City of Bryan, to ensure that these investments will not be negatively harmed by any adopted desired future conditions or regulatory methods developed and adopted by groundwater conservation districts.

The Brazos River Authority, a large scale water purveyor over a significant portion of the Carrizo-Wilcox Aquifer expressed concerns regarding (1) GCDs that treat local use differently than non-local use in permitting, (2) that current regulations encourage “use it or lose it” mentality, i.e., current district rules give no incentive to keep water in place, (3) district rules do not address conjunctive use with any specificity and in practice work against the concept, (4) permits give no assurance to continued access to the water in the “out” years, and (5) differences in groundwater management philosophies of adjacent GCDs managing and regulating essentially the same supply of water will result in recurring problems and conflicts with no clear solutions.

Environmental Stewardship submitted comments regarding concerns that the groundwater management area joint planning process and individual GCDs need to adequately capture the need to sustain spring flows and base flows to streams and rivers as a component of establishing desired future conditions. Environmental Stewardship's primary conclusion is that the groundwater management area process and GCDs have a duty and obligation to include rivers, streams and springs in the adopted desired future conditions of the Carrizo-Wilcox Aquifer.

Thirty-five comment letters (form letters) were received from landowners who are concerned that their property rights are being violated through the actions of the Lost Pines GCD. This letter states that the moratorium placed on groundwater permits in the Lost Pines GCD is preventing the citizens from selling their water to the Guadalupe-Blanco River Authority for future water supplies. The letter is reproduced below in its entirety.

"As a constituent landowner in Texas, I am writing to let you know I feel my property rights are being violated. The Lost Pines Groundwater Conservation District (LPGCD) is blocking my rights to sell my ground water. The Rule of Capture has been in effect in the State of Texas since 1904. Although tested more than once, the Texas State Supreme Court has upheld this law in every case. The legislative creation of groundwater conservation districts has, because of the actions and policy of our local district, taken away my rights to my water, and has given it to the District. The District is not bound to either its constituents or science. "Life" terms for board members, and appointee vs. elected official status, gives board members free rein to act on political motivation and personal bias, with no accountability to anyone. Across the state, districts are "hoarding" resources that are the property rights of landowners. The Carrizo-Wilcox Aquifer has more than enough water to meet the projected demands in our district for decades beyond the 50-year planning period. The Guadalupe Blanco Water Authority has signed a letter of intent to

purchase much needed municipal water supplies from my land, water that I have a legal right to sell. In addition, the project would generate considerable revenues for our county. The Lost Pines Groundwater Conservation District is attempting to block this sale. The District has placed a moratorium on issuing any permits for water to be exported outside the district pending the setting of Desired Future Conditions (DFC's) by the TWDB. The neighboring district, Post Oak Savannah Groundwater Conservation District, does not have a moratorium and is still issuing permits regardless of the DFC's. The district has denied the landowners the right to participate or comment on rules, reservations, or any action that could impact landowners by refusing to post all meetings, except their regularly scheduled monthly meetings, and denying attendance in any meeting met with less than a forum. Therefore, the LPGCD is interfering with the free market system and placing all landowners within the District at a disadvantage because of denying due process."

Thirteen comments were received from a group of landowners and board members of Gonzales-Carrizo Management, Inc. This is a group of landowners who organized and arranged to lease groundwater to Texas Water Alliance, a division of the San Jose Water Company. These survey responders state that they own property in eastern Gonzales County. This set of comments states, *"Our main concern is being able to lease our water rights. We want parity (for our eastern side of the county) with the western side of the county, with regard to the number of allocable acre feet that we are allowed to lease."*

Question 6 asks the interested party to *"Provide a list, with sufficient detail to allow for an availability analysis, of any new or alternative water management strategies that are being considered for future implementation that may impact groundwater availability in the Carrizo-Wilcox Aquifer, but are not currently in the regional and state water plans."* Two responses were received to this request for information. First, the Schertz-Seguin Local Government

Corporation submitted a preliminary project description for expansion of the existing Schertz-Seguin Local Government Corporation Project well fields in Gonzales and Guadalupe counties to include wells and/or well fields in Wilson County to provide a project yield of 10,000 acre feet per year by the year 2020. Second, Environmental Stewardship submitted a substantial set of comments and information that supported the process of establishing desired future conditions. Environmental Stewardship has been involved in the joint planning process leading to the establishments of desired future conditions, and is supporting the need to ensure sustainable management of the groundwater resources including the protection of spring flow and base flow into streams and rivers from the Carrizo-Wilcox Aquifer. Due to the volume of information submitted by Environmental Stewardship, the reader is encouraged to review the complete set of comments and information submitted by Environmental Stewardship on this survey request at the study website. Canyon Regional Water Authority submitted a lengthy commentary under this question, titled *Observations on the Regulation of the Carrizo-Wilcox Aquifer in Central and South Central Texas*. However, the content of this commentary was determined to not be related to this question. It is included in its entirety on the study website link for survey responses.

Question 7 from the Interested Parties Survey asked “*Are you aware of any compatibility issues that have already been documented or that may occur as a result of the implementation of any district’s management plan? If yes, please describe the nature of the compatibility issue.*” Six “yes” responses addressing Question 7 were received, all but one of which were from either wholesale or retail water suppliers. The main concerns raised were (1) conflicts between GCDs over different approaches to the issuance of production permits and in their interpretation and application of Chapter 36 requirements, (2) conflicts between regional water planning groups

and GCDs in that the regional water planning groups have incorporated water supplies from the Carrizo-Wilcox Aquifer in volumes that are reported to be in excess of what the Carrizo-Wilcox Aquifer ecosystem can sustain, (3) that GCDs through the groundwater management area joint planning process should submit desired future conditions that are based on preferred hydrogeologic parameters and not geographically specific production amounts, which will allow TWDB to calculate a managed available groundwater estimate for the GCDs, and (4) absence of required coordination between GCDs and regional water planning groups will lead to significant uncertainty about the reliability of water management strategies in the regional water plans. There were 12 “no” responses.

Question 8 requests the responder to *“Provide a list of any substantial enforcement actions, regardless of ultimate resolution, taken for violations of district rules since September 1, 2007. In as much detail as possible, include the dates, nature of violations, citation to rules violated, enforcement actions taken by the district, resolution actions taken by violators, and dates of compliance.”* Question 9 asks *“Are you aware of the presence of anthropogenic contaminants in the recharge zone or the production zones of the Carrizo-Wilcox Aquifer? If so, please describe the nature of the contamination (i.e.- contaminant, location, possible sources and supporting analytical data, if available).”* Of the 65 responses to the Interested Party Survey Questionnaire, no respondent answered question 8. Seventeen respondents answered question 9 with “no”, “none” or “not aware of any”.

Question 10 asks *“Are you aware of management gaps or regulatory gaps that have led to or could lead to contamination of the recharge zone or production areas of the Carrizo-*

Wilcox Aquifer? If so, please describe the management or regulatory gaps related to past, current or potential aquifer contamination.” Fourteen respondents answered this question with a negative response. There were three responses to this question regarding management or regulatory gaps. The Schertz-Seguin Local Government Corporation reported that “...there are numerous wells in the Carrizo Formation. Some are old wells that were originally used for irrigation of crops. There are also numerous oil wells that have been converted to water wells. Some of these wells are deteriorated and should be plugged but landowners are reluctant to assume financial responsibility for maintaining wells that are no longer in use.” Bexar Metropolitan Water District pointed to possible management or regulatory gaps because of the many different GCDs and their rules and the lack of consistency between them. The absence of any interstate and bi-national management of the aquifer could lead to potential future contamination of the aquifer. The City of Bryan reported that they were unaware of what regulatory controls are in place to manage the recharge zone. The City of Bryan went on to suggest that the recharge zone should be considered a sensitive area to protect these areas from sources of contamination such as from manufacturing or commercial industries. Forty-eight respondents did not answer this question.

Finally, a few other comments were received regarding the need for the study and other issues that were not specific to the questions posed in the survey. These comments are included in the online database.

1.7 Carrizo-Wilcox Aquifer Ground Water Conservation Districts Responses

For the purposes of this study, 21 confirmed GCDs are recognized as having statutory responsibilities regarding the management and conservation of groundwater resources in the Carrizo-Wilcox Aquifer. The 21 GCDs are:

1. Anderson County Groundwater Conservation District
2. Bee Groundwater Conservation District
3. Bluebonnet Groundwater Conservation District
4. Brazos Valley Groundwater Conservation District
5. Evergreen Underground Water Conservation District
6. Fayette County Groundwater Conservation District
7. Gonzales County Underground Water Conservation District
8. Guadalupe County Groundwater Conservation District
9. Live Oak Underground Water Conservation District
10. Lost Pines Groundwater Conservation District
11. McMullen Groundwater Conservation District
12. Medina County Groundwater Conservation District
13. Mid-East Texas Groundwater Conservation District
14. Neches and Trinity Valleys Groundwater Conservation District
15. Panola County Groundwater Conservation District
16. Pineywoods Groundwater Conservation District
17. Plum Creek Conservation District which is a WC&ID
18. Post Oak Savannah Groundwater Conservation District
19. Rusk County Groundwater Conservation District
20. Uvalde County Underground Water Conservation District
21. Wintergarden Groundwater Conservation District

The confirmation election for the Harrison County GCD was defeated by the voters during a May 8, 2010 election. It is not authorized to hold any subsequent election, and therefore is dissolved.

Sixteen GCDs (76 percent of the total) responded to the survey request. Survey responses were not submitted by:

1. Anderson County Groundwater Conservation District
2. Bee Groundwater Conservation District
3. Guadalupe County Groundwater Conservation District
4. Live Oak Groundwater Conservation District
5. McMullen County Groundwater Conservation District

The overarching purpose of the survey was to evaluate the scientific foundation of the management plans, rules and regulations promulgated by these Carrizo-Wilcox Aquifer GCDs. Figure 1, illustrates the location of the Carrizo-Wilcox Aquifer, the 21 GCDs, and Groundwater Management Area's 11, 12, and 13 that were reviewed through this study.

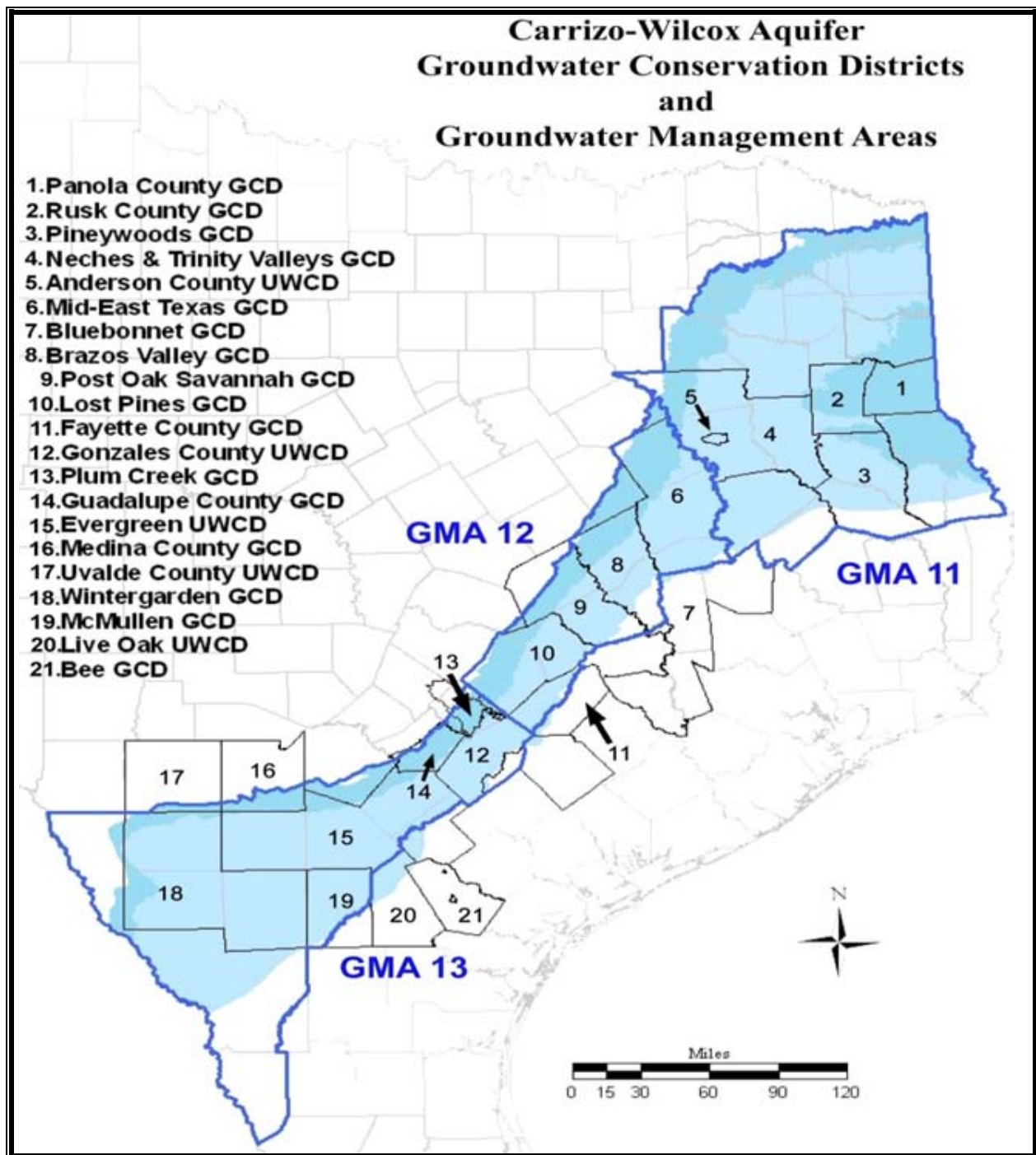


Figure 1: Carrizo-Wilcox Aquifer Groundwater Conservation Districts and Groundwater Management Areas

The 16 GCDs had three common responses to the survey question regarding predominant groundwater management and/or protection issues and concerns related to the Carrizo-Wilcox Aquifer. These responses can be characterized as concerns regarding (1) availability of water supplies and challenges involved in establishment of desired future conditions (2) need for continuous improvement of available science for purposes of decision making (3) and perceived lack of regulatory oversight by the Railroad Commission of Texas regarding oil and gas activities. Allegations are made in some of the surveys that lack of regulatory oversight has contributed to contamination of local groundwater supplies.

Seven of the 16 GCDs responded that their districts primary concern was establishment of desired future conditions that will result in protection and conservation of available groundwater resources in their district. For example, Plum Creek Conservation District (PCCD) stated their primary concern was incorporation of DFCs into their management plan and that “permitting outside the boundaries of the PCCD that could impact the amount of water that would be available to satisfy local needs in the future”. Lost Pines GCD stated that “it appears that LPGCD has already permitted more than the anticipated total of the MAGs for the district” that were established by GMA 12. Moreover, Lost Pines GCD noted that export of groundwater resources outside of the district is on the rise and that “13.5 percent of the total pumpage from non-exempt wells was exported from the district.” Current and future groundwater production capabilities are of serious concern to three quarters of the districts that responded to the survey.

Three of the 16 GCDs cited a lack of readily available groundwater science that could help them make important short-term and long-term decisions. Rusk County GCD stated the need for

more technology specifically aimed at monitoring “pumping, spring flow and aquifer volume.” Brazos Valley GCD concerns included establishment of groundwater production limits and development of Depletion Management Zones to “alleviate the depletion stress on the aquifer”, which are to be based upon “best available science.” Post Oak Savannah GCD stated “our District has significant concerns with the reliability of the GAM predictions of the groundwater levels in the CW Aquifer”. Districts throughout the Carrizo-Wilcox Aquifer expressed uncertainty derived from the availability of accurate local groundwater science and districts ability to forecast future demand.

Railroad Commission of Texas’s (RCT) groundwater management policies and enforcement procedures were a primary concern for 6 of the 16 GCDs. The RCT ability to comprehensively regulate oil and gas exploration, production, and transportation companies is contested because of the perceived inability to effectively regulate groundwater support wells and their inability to eliminate the occurrence of orphan or abandoned wells. Neches and Trinity Valleys GCD stated concerns regarding *“inadequate oversight by the RCT of oil and gas wells and rig supply wells, including the many old wells within the district, which has presented many potential sources of contamination of groundwater.”* GCDs in the eastern region of the Carrizo-Wilcox Aquifer, including Panola County GCD, Plum Creek Conservation District, Neches and Trinity Valleys GCD, and Rusk County GCD noted that there are regulatory concerns with the management of oil and gas exploration and the oversight provided by Texas agencies including the RCT and Texas Department of Licensing and Regulation (TDLR). For instance, Rusk County GCD stated: *“With each oil/gas exploration well drilled, a water well is drilled to support the operation. Due to lack of staffing, the TDLR does not conduct any construction inspections of these water wells. Our concern is for the illegal practice of screening more than one zone to gain the quantity of water needed. This practice,*

although not a major problem while the rig is in use, becomes a problem when the well is capped and left idle. The RCGCD purchased a down-hole video camera in 2008 and requires inspection of each of these support wells within 180 days of the oil/gas rig leaving the pad. We have inspected over 300 wells and have found that about 11% were screened in more than one zone.” Neches and Trinity Valleys GCD stated *“Inadequate oversight by the RCT of the oil and gas wells and rig supply wells, including the many old wells within the District, which has presented many potential sources of contamination of groundwater.”* Panola GCD stated *“lack of regulation by Railroad Commission of water wells involved in oil and gas operations and mining.”* Plum Creek CD stated *“There are management and regulatory gaps from the Railroad Commission that could possible lead to contamination of the recharge zone. These gaps are from past production practices and casing leaks.”* The aforementioned comments were submitted to the Carrizo-Wilcox Aquifer Study GCD survey.

Moreover, Rusk County GCD noted that the recharge zone for the Carrizo-Wilcox Aquifer extends beyond the borders of Texas and suggested that a management or regulatory gap could lead to contamination of the recharge zone. Rusk County GCD suggested that this gap should be addressed by the TWDB or some other state entity if it is not currently under study. Rusk County GCD also noted extensive strip mining operations in the recharge area. The strip mining process includes removing 200 to 300 feet of earth to mine the lignite. Once mined, the overburden is then replaced. This mixing of the overburden and removal of the lignite may have an effect on recharge for the Carrizo-Wilcox Aquifer. Rusk County GCD noted that this issue should be evaluated in future studies.

Chapter 2: Examination of Carrizo-Wilcox Groundwater Conservation District (GCD) Management Plans, Rules, and Procedures to Determine if they are based on Sound Scientific Principles

Chapter 2 consists of an examination of GCD management plans, rules, procedures, and meeting minutes to determine if they are based on sound scientific principles. The Texas Commission on Environmental Quality requested that the study: *“Examine rules, plans and procedures adopted by each groundwater conservation district (GCD) to determine if they are based on sound scientific principles. This information will be obtained from the GCDs using an online survey. Link individual GCD rules to (1) statutory authority and (2) to any science that was considered during development of the rules. Link individual GCD plan goals, objectives, and performance standards to any science that was considered in their development. Link individual GCD permitting procedures and decisions since September 1, 2007 to any science used in their development.”* These objectives were achieved through the solicitation of responses from the GCDs in an online survey developed for this study. The requests were as follows (a subset of total online survey):

- *Number 16 - Provide electronic copies of any scientific data, reports, or presentations presented to and considered by the district during development of the current management plan. Include board of directors meeting minutes for any meeting in which the science in question was discussed.*
- *Number 17 - Provide electronic copies of any scientific reports presented to and considered by the district during the development of the current district rules. Include in this information request electronic copies of district board of directors meeting minutes for any meeting during which the science identified was discussed.*
- *Number 18 - Provide electronic copies of any scientific reports presented to and considered by the district during the development of any procedures that have been adopted by the district. Include in this information request electronic copies of district board of directors meeting minutes for any meeting during which the science identified was discussed.*

The complete responses provided by the 16 GCDs that submitted requested information

to the study's survey questionnaire are available for review online at <http://igor.beg.utexas.edu/aquiferstudy/QuestionnaireResults.aspx?ID=4#byresponseset>.

2.1 GCD Rules and Statutory Authority

Rules promulgated by the GCDs indicates that the statutory basis of rulemaking by the Carrizo-Wilcox GCDs originates from Chapter 36 of the Texas Water Code, specifically, §36.101 which authorizes GCDs to create and enforce rules. Specific activities for which GCDs may develop and adopt rules are described throughout Chapter 36 of the Texas Water Code. In addition, Texas Water Code §36.1071 specifically provides that a GCD shall adopt rules to implement the management plans. No GCDs identified any unique rule-making authority in their responses to the study survey questionnaire beyond those contained in Chapter 36 of the Texas Water Code. Because not all of the management plans and rules were submitted through the online survey, and in order to facilitate a more complete analysis, we obtained missing management plans and rules with the assistance of staff at the Texas Water Development Board and by accessing the non-respondent GCD websites for publically available copies. A complete set of management plans and rules are available for review online at http://www.beg.utexas.edu/cswr/aquiferstudy/gcd_rules.php.

2.2 Groundwater Science and Texas Water Law

Eleven of sixteen GCDs provided supporting information to the study's request for *“electronic copies of any scientific data, reports, or presentations presented to and considered by the district during development of the current management plan.”* All 16 GCDs articulated, to varying degrees, their reliance on groundwater science, including information from groundwater

availability models that are produced and provided by the Texas Water Development Board. Nine of the 16 GCD's cited the 2007 State Water Plan and applicable regional water plans as a source for science used in developing their management plans.

The history of groundwater science in Texas is long and rich, with substantial contributions made by state agencies such as the Texas Water Development Board (and the predecessor agency, the Texas Board of Water Engineers), the Texas Commission on Environmental Quality (and predecessor agencies), GCDs, and federal agencies such as the United States Geological Survey. With the passage of Senate Bill 1 in 1997 by the 75th Texas Legislature, the need for improved, more site-specific groundwater science was recognized. This need for improved groundwater science was at least initially the result of (1) the new requirement that GCDs develop and adopt management plans (Texas Water Code, §36.1071), and (2) the regional water planning process requiring water plans be developed for the next 50 years (Texas Water Code, §16.053). As a result of this realization, the 77th Texas Legislature passed Senate Bill 2 in 2001. This legislation, in part, requires that, “*the executive administrator (of the Texas Water Development Board) shall obtain or develop groundwater availability models for major and minor aquifers in coordination with groundwater conservation districts and regional water planning groups created under Section 16.053 that overlie the aquifers. Modeling of major aquifers shall be completed no later than October 1, 2004. On completing a groundwater availability model for an aquifer, the executive administrator shall provide the model to each groundwater conservation district and each regional water planning group created under Section 16.053 overlying that aquifer*” (Texas Water Code, §16.012(1)). In recognition of the improved groundwater science that would ultimately result from this directive,

Texas Water Code, Chapter 36 was also amended to provide guidance to GCDs with regards to one of the primary sources of groundwater science to be considered in developing management plans and rules necessary to achieve the goals adopted in the management plans. Texas Water Code §36.1071(h) states, *“In developing its management plan, the district shall use the groundwater availability modeling information provided by the executive administrator together with any available site-specific information that has been provided by the district to the executive administrator for review and comment before being used in the plan.”* Specifically, Texas Water Code §36.1071(e)(3)(E) requires that a GCD management plan contain estimates of *“the annual volume of flow into and out of the district within each aquifer and between aquifers in the district, if a groundwater availability model is available.”* During the joint planning process required by Texas Water Code §36.108(d), the following requirement directing GCDs to consider the TWDB groundwater availability modeling results is included: *“Not later than September 1, 2010, and every five years thereafter, the districts shall consider groundwater availability models and other data or information for the management area and shall establish desired future conditions for the relevant aquifers within the management area...”*

Therefore, it is clear in statute that it is the intent of the Texas Legislature that one of the primary sources of groundwater science to be utilized by GCDs during their development of management plans and their adoption of desired future conditions is to be the groundwater availability models and groundwater science developed and made publically available by the executive administrator of the Texas Water Development Board. If it is the intent of a GCD to utilize local, site-specific information in the development of a management plan, or in the adoption of desired future conditions, in addition to or in lieu of the groundwater science and

groundwater availability models developed and provided by the executive administrator, the GCD must submit and obtain the prior approval of the executive administrator to use this alternative source of information (Texas Water Code §36.1071(h) and §36.108(d)).

Upon review of the submitted survey questionnaire responses and/or management plans submitted confirms the linkage between sound groundwater science provided by the Texas Water Development Board to the GCDs for their use in the development of their management plans, as required by Texas Water Code §36.1071. In addition, 5 of 16 responding GCDs cited scientific literature published by the BEG describing the hydrogeology of the Carrizo-Wilcox Aquifer. Six GCDs referenced material utilized in joint planning sessions within their Groundwater Management Areas. Ten GCDs worked with technical consultants to develop their individual GCD management plans and rules.

The survey also asked GCDs to submit “*electronic copies of any scientific reports presented to and considered by the district during the development of the current district rules.*” A review of current statute documents that the current sequence of management activities and decision points is (1) adoption of desired future conditions, (2) adoption of a management plan designed to achieve desired future conditions, and (3) adoption of rules designed to achieve the goals of the management plan. Therefore, it is not surprising that for most GCDs, the majority, if not all science developed to address an affected provision included in GCD rules was originally developed during deliberations leading up to the adoption of desired future conditions and management plans. This reality was evidenced by the limited nature of the response by GCDs to the request for information considered during development of rules.

2.3 Linkage between Sound Scientific Groundwater Principles and GCD Management Plans and Rules

All 16 GCDs that responded to the online survey stated, either in their direct response or in the text included in their management plan, that they utilized sound scientific principles in their adopted management plans. As discussed earlier, this use of sound scientific principles is in large part a result of the direct linkage in statute between the groundwater science produced by the TWDB and requirements for certain elements to be included in GCD management plans. However, the linkage between sound scientific principles and rules adopted by Carrizo-Wilcox GCDs is, for the most part, dependent upon the assumption that necessary science considered during the development of a management plan was adequate for the subsequent development and adoption of rules. To review, one of the objectives of the Study was to, *“Examine rules, plans and procedures adopted by each groundwater conservation district (GCD) to determine if they are based on sound scientific principles. This information will be obtained from the GCDs using an online survey. Link individual GCD rules to ...any science that was considered during development of the rules...Link individual GCD permitting procedures and decisions since September 1, 2007 to any science used in their development.”* After an examination of the rules and scientific information provided by the GCDs, the following observations are noted. First, 6 of the 16 GCDs that responded to the study survey questionnaire provided information regarding the request for scientific information utilized during rulemaking. Next, of those six GCDs, one GCD clearly articulated the direct linkage between the scientific information that was utilized with the corresponding rule(s) that was subsequently adopted. This district was the Pineywoods GCD. However, it is noted that in the process of adopting rules, decisions made by GCD boards

of directors may be based on the cumulative consideration of a number of information sources, such as local studies, regional studies such as regional water plans, and groundwater availability modeling studies, and not just one specific study. Perhaps more importantly, it is also noted that the main focus of scientific efforts from a process perspective is during the adoption of desired future conditions and management plans. The development and adoption of rules is a process designed to achieve the adopted desired future conditions and management plan, and therefore the consideration of science has already occurred earlier in the decision process.

The following summaries are provided to better articulate this point:

Bluebonnet GCD submitted a list of approximately 16 scientific publications, not all of which were related to the Carrizo-Wilcox Aquifer. There was no supporting information or meeting minutes submitted that articulated how any of this information was considered, if at all, by the board of directors during rule-making activities.

Pineywoods GCD submitted copies of board meeting minutes and two presentations that were considered during the rulemaking process. One of these presentations provided a link between the scientific reasoning and adoption of District *Rule 14* that enables the Pineywoods GCD to regulate the transfer of groundwater outside of the district. The Pineywoods GCD adopted *Rule 14* based upon regional water planning demand projections, groundwater availability modeling estimates, and population projections for the region. In the materials provided, the Pineywoods GCD ultimately decided to establish a transfer rule that safe guards the region's water supply future and potential socioeconomic development. The rule's purpose states:

“In recognition of the fact that the transfer of groundwater resources from the District for use outside of the District impacts residents and property owners of the District differently than use within the District, and in order to manage and conserve groundwater resources within the District, and provide reasonable protection of the public health and welfare of residents and property owners of the District, a ground water transfer permit is required to produce groundwater from within the District’s boundaries and to transfer such groundwater for use outside the District.”

Gonzales County Underground Water Conservation District (UWCD) submitted six reports in response to the Study’s request for scientific information that was utilized during their rulemaking procedures. The reports submitted are as follows:

- *South Central Carrizo System Groundwater Model*, presented by the San Antonio Water System and HDR Inc.
- *Technical Comparison of Southern and Central Carrizo-Wilcox Groundwater Availability Models (GAMs) in Overlap Area*, presented by the San Antonio Water System and HDR Inc.
- *Ground Water Velocity*, presented by the Center for Water Supply Studies Texas A&M University-Corpus Christi
- *Comparison between the South Central Carrizo System Groundwater (SCCS) Model and the Southern Queen City and Sparta Aquifer (QSCW) GAM*, presented by URS
- *Status of Joint Planning in Groundwater Management Areas*, presented by the Texas Water Development Board
- *Groundwater Availability Model for the Southern Carrizo-Wilcox Aquifer*, presented by Intera and Parsons

Though the studies provided by the Gonzales County UWCD are relevant and supported by sound scientific principles, we were unable to discern where the science submitted was

specifically linked to the rules of the Gonzales County UWCD. However, meeting minutes submitted by the district document that these presentations were made to the board of directors.

Rusk County GCD provided a variety of information and datasets that have been assembled relevant to the groundwater resources of Rusk County. However, this information was not cited by the board of directors in any meeting minutes during development of rules. It is noted that the district's well monitoring activities were utilized in implementing the District's Drought Contingency Plan.

Fayette County GCD submitted several scientific reports and exhibits produced by Daniel B. Stephens & Associates, Inc., including a hydrogeologic study of the various aquifers within the region and various district maps produced by the Thornhill Group, Inc. Further, after review of the Fayette County GCD's board meeting minutes provided in response to the study survey questionnaire, rule-making and amending of the rules were often discussed. A review of meeting minutes documented several instances where development of the rules was addressed.

Plum Creek Conservation District provided seven DVDs with numerous articles of information that supported the board of director's decision making process during the development of management plan and rules. It is clear from information contained on the DVDs provided that the PCCD did go through a deliberate process to ensure that sound scientific principles were considered during their decision making process.

Chapter 3: Enforcement by Groundwater Conservation Districts with Rules Regarding the Carrizo-Wilcox Aquifer

Chapter 3 reviews enforcement actions by groundwater conservation districts that support the compliance of district rules and promote the groundwater management of the Carrizo-Wilcox Aquifer. There are 21 GCDs that overlie the Carrizo-Wilcox Aquifer with jurisdictional authority and therefore responsible for the management and conservation of the groundwater resources, as required by the Texas Water Code. Throughout the chapter, italicized text indicates language lifted directly from the surveys developed and utilized for this study.

3.1 Online Survey

“Evaluate each groundwater conservation district for enforcement of substantial compliance with its rules. Tabulate number of enforcement actions since September 1, 2007. This information will be obtained from the groundwater conservation districts (GCDs) using an online survey.”

Chapter 3, as the previous chapters, references the two online surveys developed for this course study: one for GCDs with jurisdictional authority over the Carrizo-Wilcox Aquifer, and another for parties identified as having an interest in the management of the Carrizo-Wilcox Aquifer (Interested Parties Survey).

Of the 21 GCDs with jurisdictional authority over the management and conservation of the Carrizo-Wilcox Aquifer, 16 responded to the survey (Table 1). Thirteen of the 16 indicated that they did not pursue either formal or informal enforcement actions for violations of their rules. Three GCDs indicated that they had carried out formal enforcement action under their rules since September 1, 2007.

Table 1: The 21 GCDs with jurisdictional authority over the Carrizo-Wilcox Aquifer

#	Groundwater Conservation Districts	Did they respond to the survey?
1	<i>Anderson County GCD</i>	<i>no</i>
2	<i>Bee GCD</i>	<i>no</i>
3	<i>Bluebonnet GCD</i>	<i>yes</i>
4	<i>Brazos Valley GCD</i>	<i>yes</i>
5	<i>Evergreen UWCD</i>	<i>yes</i>
6	<i>Fayette County GCD</i>	<i>yes</i>
7	<i>Gonzales County UWCD</i>	<i>yes</i>
8	<i>Guadalupe County GCD</i>	<i>no</i>
9	<i>Live Oak UWCD</i>	<i>no</i>
10	<i>Lost Pines GCD</i>	<i>yes</i>
11	<i>McMullen County GCD</i>	<i>no</i>
12	<i>Medina County GCD</i>	<i>yes</i>
13	<i>Mid-East Texas GCD</i>	<i>yes</i>
14	<i>Neches & Trinity Valleys GCD</i>	<i>yes</i>
15	<i>Panola County GCD</i>	<i>yes</i>
16	<i>Pineywoods GCD</i>	<i>yes</i>
17	<i>Plum Creek GCD</i>	<i>yes</i>
18	<i>Post Oak Savannah GCD</i>	<i>yes</i>
19	<i>Rusk County GCD</i>	<i>yes</i>
20	<i>Uvalde UWCD</i>	<i>yes</i>
21	<i>Wintergarden GCD</i>	<i>yes</i>

In the survey to the 21 GCDs with jurisdictional authority over the Carrizo-Wilcox Aquifer, the specific information request stated:

“#19. Provide a list of all substantial enforcement actions taken for violations of district rules since September 1, 2007. The district should include in this list the dates, nature of violations, citation to rules violated, enforcement actions taken by the district, resolution actions taken by violators, and dates of compliance.”

The Interested Parties Survey contained a similar request:

“#5. Provide a list of any substantial enforcement actions, regardless of ultimate resolution, taken for violations of district rules since September 1, 2007. In as much detail as possible, include the dates, nature of violations, citation to rules violated, enforcement actions taken by the district, resolution actions taken by violators, and dates of compliance.”

A variety of stakeholders responded to the survey including 49 concerned citizens and landowners. Further, 11 other entities responded to the survey including the Gonzales-Carrizo Management, Inc. landowners association, the Plum Creek Group, the City of Bryan, the San Antonio Water System, Aqua Water Supply Corporation, Bexar Metropolitan Water District, Environmental Stewardship, the Brazos River Authority, the Schertz-Seguin Local Government Corporation, the Canyon Regional Water Authority, and the Lavaca County GCD.

Only respondent information provided through these two surveys are included in this report.

3.2 GCD Rules and Regulations

GCDs are authorized through their enabling legislation to promulgate rules and regulations necessary to manage and conserve groundwater resources within their jurisdictional boundaries. Moreover, GCDs are provided the ability to construct policies and rules that may aid the GCD in meeting goals established in the GCD’s management plan. GCDs are directed by statute to develop rules and regulations that will facilitate compliance with broader policy goals within their jurisdictional boundaries.

Enforcement actions that promote current and future compliance with GCD rules are considered positive enforcement actions. Alternatively, enforcement actions where violators

simply choose to pay a fine and continue to be in non-compliance are considered by the study team to be negative enforcement actions. That is, the enforcement approach is not a deterrent to future violations. The following section details positive and negative enforcement actions identified as part of the Study.

3.3 Survey Responses from Carrizo-Wilcox GCDs

There are 21 confirmed GCDs with jurisdictional responsibilities for the Carrizo-Wilcox Aquifer. Of the 21 GCDs, 16 submitted at least partial responses to the GCD survey questionnaire developed for the Study. Six GCDs included a response to the survey request “*to provide a list of all substantial enforcement actions taken for violations of district rules since September 1, 2007.*” Three of the six GCD’s stated that they had carried out formal enforcement actions since September 1, 2007.

Pineywoods GCD cited nine enforcement actions since September 2007. Eight of the nine violations were resolved through positive enforcement actions. Table 2 details violations including: failing to register a well, well contamination, and well construction without a permit. Fines and fees were assessed by the Pineywoods GCD and paid by the violators. The violations were resolved resulting in compliance with the rules.

Table 2: Violations from the Pineywoods Groundwater Conservation District.				
Date	Violations	Rules Violated	Enforcement Actions	Violator's Actions
7/10/07	<i>Jeanine Butler, Deteriorated Well</i>	<i>TOC§1901.255</i>	<i>Notice of Violation</i>	<i>Compliance, Well Capped</i>
5/20/08	<i>Melrose, No Permit</i>	<i>Water Code§36.001 (8)(B)(E), 1.1(s), 2(a)(b)(a)</i>	<i>Notice of Violation</i>	<i>Compliance, Permit Fee Paid & Permits Renewed</i>
1/8/09	<i>ETTL Engineering, No Permit</i>	<i>District Rule 3.1 TAC§76.700(1)</i>	<i>Notice of Violation</i>	<i>Compliance</i>
1/22/09	<i>Keithville, Drilling Without Permit</i>	<i>District Rule 3.1 TAC§76.700(1)</i>	<i>Notice of Violation</i>	<i>Compliance</i>
1/30/09	<i>Smithers, Drilling Without Permit</i>	<i>District Rule 3.1, 3.4, 5.1, 6(a)(b) TAC§76.700(1)</i>	<i>Notice of Violation, board action penalties</i>	<i>Compliance, Penalties of \$2,750 paid</i>
4/24/09	<i>Cotton Thompson, No Permit</i>	<i>District Rule 3.1 Water Code §36.115(a), §36.119(a)</i>	<i>Notice of Violation</i>	<i>Compliance</i>
8/5/09	<i>Emmett Luman, Possible Contamination</i>	<i>District Rule 3.1, 3.4, 5.1, 6(a)(b) TAC§76.700(1)</i>	<i>Notice of Violation</i>	<i>Compliance</i>
1/4/10	<i>Jimmy Cordova, Rehabilitation of Well Without Registering</i>	<i>District Rule 3.1 Water Code §36.115(a), §36.119(a)</i>	<i>Notice of Violation</i>	<i>Compliance</i>
1/28/10	<i>Kenneth Mechell, Contamination</i>	<i>TAC§76.1000(a)(4)</i>	<i>Notice of Violation</i>	<i>On-Going</i>

Neches & Trinity Valley GCD reported two enforcement actions that had been ongoing or resolved since September 1, 2007. In both enforcement actions the *Neches & Trinity GCD* was able to bring the violators into compliance through the use of the courts and assessing fines. These actions may be considered positive enforcement actions as the violators did not simply elect to pay the fees and continue to violate district rules.

In the first enforcement, the *Neches & Trinity Valley GCD* reported:

“Lakeshore Utilities Co. had drilled two wells without drilling permits and had not submitted operating permit applications or quarterly pumping report. They also had not paid any fees due to these violations. In February 2008 Lakeshore agreed to a settlement agreement to pay District legal fees and all back pumping fees. They had previously completed the drilling and operating permit applications and begun reporting and paying for current pumping. The settlement was reached out of court.”

In the second enforcement action, the Neches & Trinity Valley GCD reported:

“Eagles Bluff County Club (AKA Lake Palestine Associates, LP) was operating a well when the District began operating in 2003 and did not register the well, obtain an operating permit, nor submit quarterly pumping reports and pay the required fees. A settlement agreement was reached in December 2008 with Lake Palestine Associates, LP agreeing to pay back pumping fees and District legal expenses. They had previously submitted an operating permit application and began submitting quarterly pumping reports and paying current pumping fees.”

Post Oak Savannah GCD made a total of six positive enforcement actions, for which a total of \$1,700 in fines was assessed from April 8, 2008 through February 9, 2010. The following Post Oak Savannah GCD rules were violated: one infraction of Rule 7.12, Drilling Permits; two infractions of Rule 7.13, Drilling or Altering a Well; two infractions of Rule 7.3, Records, Reports, and Drillers Logs; and one infraction of Rule 8.2, Application for Transport Permit. The fines assessed per violator ranged from \$100 to \$900. Table 3, below, is reproduced in its entirety from materials submitted by Post Oak Savannah GCD and details the five various violators and six infractions of the rules. One violation was from the oil and gas sector and all other violators were from the commercial and residential water supply sector.

Table 3: Summary of Post Oak Savannah Groundwater Conservation District Enforcement Actions

1.) April 8, 2008 – Chucks Oilfield Service - Violation of District Rules – Producing groundwater from a non-exempt well without a permit from the District. Fine \$250.00

The owners of Chuck's Oil Field Service, upon notice from the District, immediately filed permit applications to become compliant with District Rules and paid all fees associated with the amounts of water which had been produced as well as application fees and the fine. Chuck's also became compliant with all other Rules of the District as directed by the Board.

RULE 7.12. DRILLING PERMITS.

1.) A landowner, well owner, or any other person acting on their behalf, must obtain a drilling permit before a new non-exempt well may be drilled, equipped, or completed. Such permit must also be obtained before re-drilling, replacing or altering a new or existing well that is not exempt under Rule 7.10(2)(a)(b) or (c). Except as otherwise provided in these rules, wells that are to be used for domestic use, or for poultry or livestock purposes, and that are located on a tract of land that is less than ten acres in size, including wells that will be equipped so as not to be able to produce more than 25,000 gallons per day (GPD), must comply with the requirements set forth in these rules.

2.) April 15, 2009 – Siegert Water Wells – Violation of District Rules – Drilling exempt water wells for oil and gas use (Chapter 36.117, TWC) without filing appropriate reports to the District. Fine \$900.00

Upon notice from the District Siegert filed all necessary reports and became compliant with all Rules.

RULE 7.3. RECORDS, REPORTS, AND DRILLER'S LOGS. The driller of a well shall keep an accurate driller's log for each new well. The driller shall file a copy of each log and a report detailing the drilling, equipping, and completing of the new well with the District within 60 days after the date the new well is completed. The report shall include all information submitted by the driller to any agency of the State of Texas.

Table 3: Continued

3.) July 14, 2009 – James Eugene Luce - Violation of District Rules – Drilling a well without a license and registration and failure to file reports to the District. Fine \$200.00

The District required Mr. Luce to file all necessary reports with the District and then to plug the well. The reports were filed and the well was duly plugged, and the fine was paid within 60 days.

RULE 7.13. DRILLING OR ALTERING A WELL. No person may drill a new non-exempt well without first obtaining a drilling permit from the District. A new well described in Rule 7.10(1) must obtain a drilling permit and be registered.

RULE 7.3. RECORDS, REPORTS, AND DRILLER’S LOGS. The driller of a well shall keep an accurate driller’s log for each new well. The driller shall file a copy of each log and a report detailing the drilling, equipping, and completing of the new well with the District within 60 days after the date the new well is completed. The report shall include all information submitted by the driller to any agency of the State of Texas.

4.) August 6, 2009 – Brien Water Wells – Violation of District Rules – installing pump in existing well without well owner obtaining a permit – Fine \$100.00

Brien Water Wells, after putting a pump in an existing water well, prior to property owner obtaining a permit, filed all necessary reports with the District and then assisted the District in obtaining compliance from the property owner to permit the well. The fine was paid and compliance achieved within 30 days.

RULE 7.13. DRILLING OR ALTERING A WELL. No person may increase the production rate or the size of a non-exempt well or well pump to exceed the production rate, well or well pump size authorized in the permit, and no person may increase the production rate or size of a well or well pump of a well that is exempt under Rule 7.10(1)(a) or (b), or Rule 7.10(2)(a) to increase the production capacity of the well to more than 25,000 GPD, without first applying for and obtaining a permit from the District.

Table 3: Continued
5.) February 9, 2010 – Blue Water Systems Violation of Permit – Fine \$250.00
<i>Upon notice from the District that Blue Water Systems (BWS) was not compliant with the Rules and terms of their permit, BWS forwarded to the District the necessary documents and amended their contracts with their customers to become compliant with the Rules and requirements and paid the fine within 60 days.</i>
RULE 8.2. APPLICATION FOR TRANSPORT PERMIT. If the water is to be resold to others, provide a description of the applicant's service area, metering, leak detection and repair program for its water storage, delivery and distribution system, drought or emergency water management plan, and information on each subsequent customer's water demands, including population and customer data, water use data, water supply system data, alternative water supply, water conservation measures and goals, conjunctive use, and the means for implementation and enforcement of all applicable rules, plans, and goals.

GCDs are authorized to implement rules including the assessment of fees and levying legal charges against violators. However, 13 of the 16 GCDs that responded to the study's survey questionnaire reported that they had neither formal enforcement actions nor informal enforcement actions (informal enforcement actions being GCD actions such as communications from GCD staff to a potential violator that a problem exists and if no corrective action is taken, the potential violation will be taken to the Board of Directors for formal enforcement action).

For instance, Rusk County GCD stated that:

“There have been no enforcement actions taken for violations of district rules. When developed, the rules were reviewed with all local entities involved, TWDB, TCEQ, TDLR, and Railroad Commission of Texas. Because of this collective approach, applicability of our rules has been reinforced through occasional communication between local entities and State enforcement agencies. This cooperative effort has led to positive acceptance by all parties of our rules. The District has also been successful in working with violators to ensure compliance, suspending the need to enter into formal enforcement procedures.”

Brazos Valley GCD and Fayette County GCD reported that: *“The District has followed up on many complaints and violations for alleged waste, illegal drilling of a well, drilling of a well in*

violation of spacing requirements, producing over permitted amount, and abandoned wells; but to date, communications (written and oral) with the District’s board, staff and attorney have resolved the issues without having to pursue formal enforcement measures. As all of the issues were resolved, the District does not consider these occurrences “substantial violations.”

3.4 Survey Responses from Interested Parties

Of the 65 responses to the Interested Party Survey, there were no responses regarding enforcement actions taken by the GCDs with jurisdictional authority over the Carrizo-Wilcox Aquifer.

3.5 Conclusions

Twenty-one GCDs have jurisdictional authority over the management and conservation of the Carrizo-Wilcox Aquifer. Of those 21, three GCDs—or less than 15 percent of the 21 GCDs—reported substantial enforcement actions stemming from violations of GCD rules. All enforcement actions were instances of positive enforcement (intentionally punitive), as there were no instances of negative enforcement reported as part of this study. Based on a review of other documentation submitted as part of the Carrizo-Wilcox Aquifer Study such as GCD Board meeting minutes, it appears that there have been numerous violations of rules within certain GCDs, but in all but one case, based on the meeting minutes, it appears that violations were resolved informally.

Chapter 4: Regional and State Water Plans and their Potential Conflicts with Carrizo-Wilcox Ground Water Conservation Districts' (GCDs) Management Plans

Chapter 4 details Carrizo-Wilcox Aquifer Study directive to “*Evaluate current regional and state water plans and all Carrizo-Wilcox aquifer related strategies for conflicts with Groundwater Conservation District (GCD) plans; conduct stakeholder meetings to present the goals and results of the study, and to identify, tabulate and describe every existing and projected water user group strategy or alternative strategy that is presently or is likely to impact groundwater use from the Carrizo-Wilcox Aquifer including but not limited to strategies for the use of brackish groundwater.*”

In the scope of work for the study, the use of the phrase “...*Evaluate current regional and state water plans and all Carrizo-Wilcox aquifer-related strategies for conflicts with GCD plans*” resulted in some unique challenges with respect to the timing of the plans in question. The following are provided to illustrate these challenges:

- GCDs, through their participation in the joint planning process, were statutorily required (TWC §36.108(d) to adopt Desired Future Conditions (DFCs) and submit them to the Texas Water Development Board (TWDB) by September 1, 2010
- Regional water planning groups were required by rule (31 TAC §357.5(b)(2)) to submit updated regional water plans to the TWDB for approval by September 1, 2010 (note that a few regions were granted time extensions of approximately one month), and finally,
- The TWDB is statutorily required to submit an updated state water plan reflecting the 2011 regional water plans (that were submitted on September 1, 2010) to the Governor,

Lieutenant Governor, Speaker of the House, and to the Chairs of the Natural Resource Committees by January 5, 2012 (TWC §16.051(a)).

Chapter 4 was designed to evaluate regional and state water plans and GCD management plans in order to identify conflicts that may exist between the two planning processes. Ideally, this evaluation would occur after the 2011 regional water plans were adopted and all Carrizo-Wilcox GCDs had amended their respective management plans to reflect adopted Desired Future Conditions (DFCs) and estimates of Managed Available Groundwater (MAG). Due to the very recent submission of DFCs when this chapter was written all estimates of MAG were still in draft form and at the time the Carrizo-Wilcox GCDs did not have sufficient time to amend their management plans to integrate the adopted DFC.

In order to provide a meaningful evaluation that generally reflects the intent and goal of chapter 4, accommodations were made for the following realities of the various timelines. These include:

- Delivery of this report was delayed by approximately two months in order to allow the TWDB to process applicable data in the 2011 regional water plans pertaining to currently available supplies and water management strategies that utilize the Carrizo-Wilcox Aquifer.
- It is understood that the data provided by the TWDB are provisional in nature, in that TWDB staff are currently engaged in the final review and approval of regional water plans, and as such, certain water management strategies may need to be revised prior to final approval of the regional water plans by the TWDB.

- It is also understood that the MAGs provided by the TWDB were in draft form, pending review and comment from the Carrizo-Wilcox GCDs regarding quantification of exempt use. After exempt use has been established for each county and aquifer, that amount will be deducted from the MAGs utilized in this report. The sum of exempt use and MAG estimates will then represent the total amount of pumping consistent with the adopted DFC. While the MAG estimates may change due to comments from the GCDs, the estimates of total amount of pumping consistent with the DFCs (referred to as MAGs in this report) are not expected to change. This total amount of pumping is what is directly analogous to groundwater availability in the regional water plans. It is expected that the 2016 regional water plans will include this total amount of pumping (which includes exempt use + the MAG). Until exempt use had been quantified, for the purposes of this study, MAG equals the total amount of pumping consistent with the DFC.

- With respect to a review of the regional and state water plans, it is recognized that we are currently in the interval between adoption of regional water plans and adoption of a state water plan. As such, the current state water plan is now four years old, and in many cases, inconsistent with recently adopted regional water plans. For the purposes of this study, in order to utilize the most current information and to avoid unnecessary confusion, information regarding currently available supplies and water management strategies from the recently adopted regional water plans was utilized for this analysis. Information from the 2007 State Water Plan was reviewed, but will not be presented in this report.

- In the 2016 regional water plans and the 2017 State Water Plan, the total amount of groundwater available to meet current and future needs can be no more than the MAG for the

most recently adopted DFC. The study attempted to answer the question, “*Evaluate current regional and state water plans and all Carrizo-Wilcox aquifer related strategies for conflicts with GCD plans*”. What is not defined explicitly during this transitional stage of planning (both regional water planning and joint planning for GCDs) is what constitutes a conflict. For reference, 31 TAC §356.2(a)(6) states a conflict is “*A situation where the managed available groundwater identified in a management plan or the adopted state water plan is not the managed available groundwater based on the desired future conditions set by the groundwater conservation districts in the groundwater management area.*” This definition will be universally applicable during the 2016 regional water plans and 2017 State Water Plan. However, due to the timing of submission of DFCs and calculation of MAGs by the TWDB, none of the Carrizo-Wilcox GCDs were able to provide official MAGs in time for inclusion in the 2011 regional water plans. Therefore, technically, no conflict can exist at this time. For the purposes of Task 3, we did compare, on a county by county basis, the sum of Carrizo-Wilcox Aquifer availability and water management strategies that rely on the Carrizo-Wilcox Aquifer to the draft estimates of MAG for the Carrizo-Wilcox Aquifer from the initial round of joint planning that just concluded on September 1, 2010. Therefore, solely for the purposes of this evaluation, a “potential conflict” is defined as “where, on a county-level evaluation, the sum of current water supplies available from the Carrizo-Wilcox Aquifer and water management strategies that rely on groundwater from the Carrizo-Wilcox Aquifer in a county are greater than or exceed the MAG for the same county.”

4.1 Methodology

This chapter was prepared using three different types of data; (1) amount of water supplies currently available from the Carrizo-Wilcox Aquifer based on information contained in the recently adopted 2011 regional water plans, (2) amount of additional water to be obtained from the Carrizo-Wilcox Aquifer recommended as water management strategies in the recently adopted regional water plans, and (3) draft estimates of MAG from the recently completed joint planning process. Information for (1) and (2) were provided by TWDB Water Resources Planning and Information staff (email dated October 7, 2010) and MAG estimates were provide by TWDB Water Science and Conservation staff (email dated October 5, 2010).

In order to compare the relevant data, an examination of the different data sources is appropriate. Water supplies available from the Carrizo-Wilcox Aquifer, as reported in the regional water plans on a decadal basis, are defined, in part, in 31TAC §357.7(a)(3) as the “...existing water supplies legally and physically available to the regional water planning area for use during drought of record....” In other words, the water supply has to be legally available (i.e., permits obtained) and infrastructure to transport the water to the current or future users has to be in place in order for the water to be counted as a current water supply. If the groundwater cannot be legally produced at this time or the infrastructure is not in place at the time of the plan development, then the groundwater may not be counted as a currently available supply. Any incremental increase in water to meet future water supply needs over what is currently available must be included as a recommended water management strategy in the applicable regional water plan. To include a future supply as a recommended water management strategy, the amount of water must be quantified on a decadal basis in the regional water plan. For the purposes of this

evaluation, it is assumed that all water management strategies will be implemented in the amount and time prescribed in the 2011 regional water plans.

4.2 Results

For the purposes of this analysis, 64 counties were included in data provided by the TWDB containing information from the 2011 regional water plans and/or estimates of MAG. Table 4 contains information on the 64 counties, including the regional water planning area, groundwater management area, and on a decadal basis, (1) the sum of currently available water supplies and water management strategies, (2) the MAG, and (3) the difference between (1) and (2) which is referred to as “*Difference*”. Figures 1–3 illustrate the decadal values for (1) and (2) for the years 2010 and 2060, for all counties within the jurisdictional boundaries of a Carrizo-Wilcox GCD.

“*Difference*” values noted in Table 4 with parentheses (xxx) documents that the sum of currently available supplies and water management strategies for the Carrizo-Wilcox Aquifer in the county and decade referenced in the 2011 regional water plans is greater than the total amount of pumping consistent with the DFC (or for the purposes of this report as discussed earlier, the MAG). Of the 56 counties analyzed that are included as a current supply or water management strategy in the 2011 regional water plans and have an estimate of MAG from the recently completed joint planning process, 20 have potential conflicts, representing 35 percent of the total. Of these 20 counties with potential conflicts, five are not within the jurisdictional boundaries of a GCD - Van Zandt County has a potential conflict in 2060; Maverick County has potential conflicts in four decades, 2020-2060; Navarro, Webb and Williamson counties are

among the counties with potential conflicts in all decades of the 50-year planning horizon. Absent a GCD, there is no mechanism to implement management activities to achieve the DFC.

Included in Table 4 are six counties (Bee, DeWitt, Graves, Live Oak, McLennan and Travis) that included either currently available supplies or water management strategies from the Carrizo-Wilcox Aquifer, but for which there is no MAG. This situation may occur under multiple scenarios. For example, in the most common case, water supplies from the Carrizo-Wilcox Aquifer may be either currently or being planned for importation into a county. Alternatively, as is the case in Travis County (which does not have any Carrizo-Wilcox Aquifer present in the county), a political subdivision, such as the city of Elgin, may be located in two or more counties,(e.g., the city of Elgin is located in the Bastrop and Travis counties). For regional water planning purposes, the source of water supplies or water management strategies is identified on a county-by-county basis. Therefore, Carrizo-Wilcox Aquifer water supplies for the city of Elgin will be included for both counties.

Alternatively, there are two counties within GMA 11 (Red River County with a MAG of 0 and Trinity County with a MAG of 2,215 acre-feet per year), but neither have any currently available supplies or water-management strategies from the Carrizo-Wilcox Aquifer in the 2011 regional water plans. This situation is typically results when an aquifer is overlain by another aquifer that is shallower and of superior water quality and quantity, such that there is no planned or current use of the deeper aquifer. This is especially true in areas where the freshwater portion of the Carrizo-Wilcox Aquifer is at its most down-dip limits. For example, Bee Groundwater GCD and Live Oak Underground Water Conservation District both have jurisdictional boundaries that include at least some area within the boundaries of the Carrizo-Wilcox Aquifer.

However, these GCDs were included in other GMAs, due primarily to the relatively minor amount of Carrizo-Wilcox Aquifer resources within the GCDs as compared to the primary aquifer for those GCDs, which, in this case, is the Gulf Coast Aquifer.

There are three counties in GMA 11 (Angelina, Henderson and Van Zandt), seven counties in GMA 12 (Bastrop, Brazos, Burleson, Freestone, Navarro, Uvalde and Williamson) and 10 counties in GMA 13 (Atascosa, Dimmitt, Frio, Gonzales, Guadalupe, Karnes, LaSalle, Maverick, Medina and Webb) with potential conflicts for at least one decade during the 50-year planning horizon from 2010–2060. Bastrop, Dimmitt, Frio, Guadalupe, LaSalle, Navarro, Webb, and Williamson counties have potential conflicts for all of the decades during this 50-year planning horizon. These potential conflicts range in magnitude from 13 acre-feet per year in Maverick County to 176,615 acre-feet per year in Frio County.

Of the 56 counties analyzed that are included as a current supply or water management strategy in the 2011 regional water plans and have an estimate of MAG from the recently completed joint planning process, 20 have potential conflicts, representing 35 percent of the total. Of these 20 counties with potential conflicts, five are not within the jurisdictional boundaries of a GCD: Van Zandt County has a potential conflict in 2060; Maverick County has potential conflicts in four decades, 2020-2060; and Navarro, Webb, and Williamson counties are among the counties with potential conflicts in all decades of the 50-year planning horizon. Absent a GCD, there is no mechanism to implement management activities to achieve the DFC.

Strictly for the counties within the jurisdictional boundaries of a GCD in GMAs 11, 12, and 13, an evaluation was conducted to quantify, on a GMA basis, the sum of the negative, positive, and net values presented in Table 4. These values are presented for 2010 and 2060 in

Table 5. While the net values for GMA 11 and 12 have a net positive value for both 2010 and 2060, it is interesting to note that the net value for GMA 13 is negative, (84,793) acre-feet per year in 2010 and negative (158,902) in 2060. Based on this analysis, if the estimates of MAG (the total amount of pumping consistent with the DFC) remain the same in the 2016 regional water plans as it is today, then the volume of water from Carrizo-Wilcox Aquifer recommended to meet future water supply needs will have to be reduced significantly.

Task 3 of the Carrizo-Wilcox Study directed research to evaluate the water management strategies in the regional water plans *“that is presently or is likely to impact groundwater use from the Carrizo-Wilcox Aquifer including but not limited to strategies for the use of brackish groundwater.”* Table 6 provides summary information on all Carrizo-Wilcox Aquifer water management strategies in the 2011 regional water plans and the counties receiving the supplies. It is important to note that the amount of water represented in Table 6 is a subset of the sum of currently available supplies and water management strategies reported in Table 4. No water management strategies are planned for implementation prior to 2020. The volume of brackish groundwater recommended as water management strategies in the 2011 regional water plans begins at 12,260 acre-feet per year in 2020 and increases to 37,357 acre-feet per year in 2060. Six counties are scheduled to receive brackish groundwater supplies based on recommended water management strategies in the 2011 regional water plans. These are Bexar, Comal, Guadalupe, Hays, Maverick, and Wilson counties, with the majority going to Bexar County.

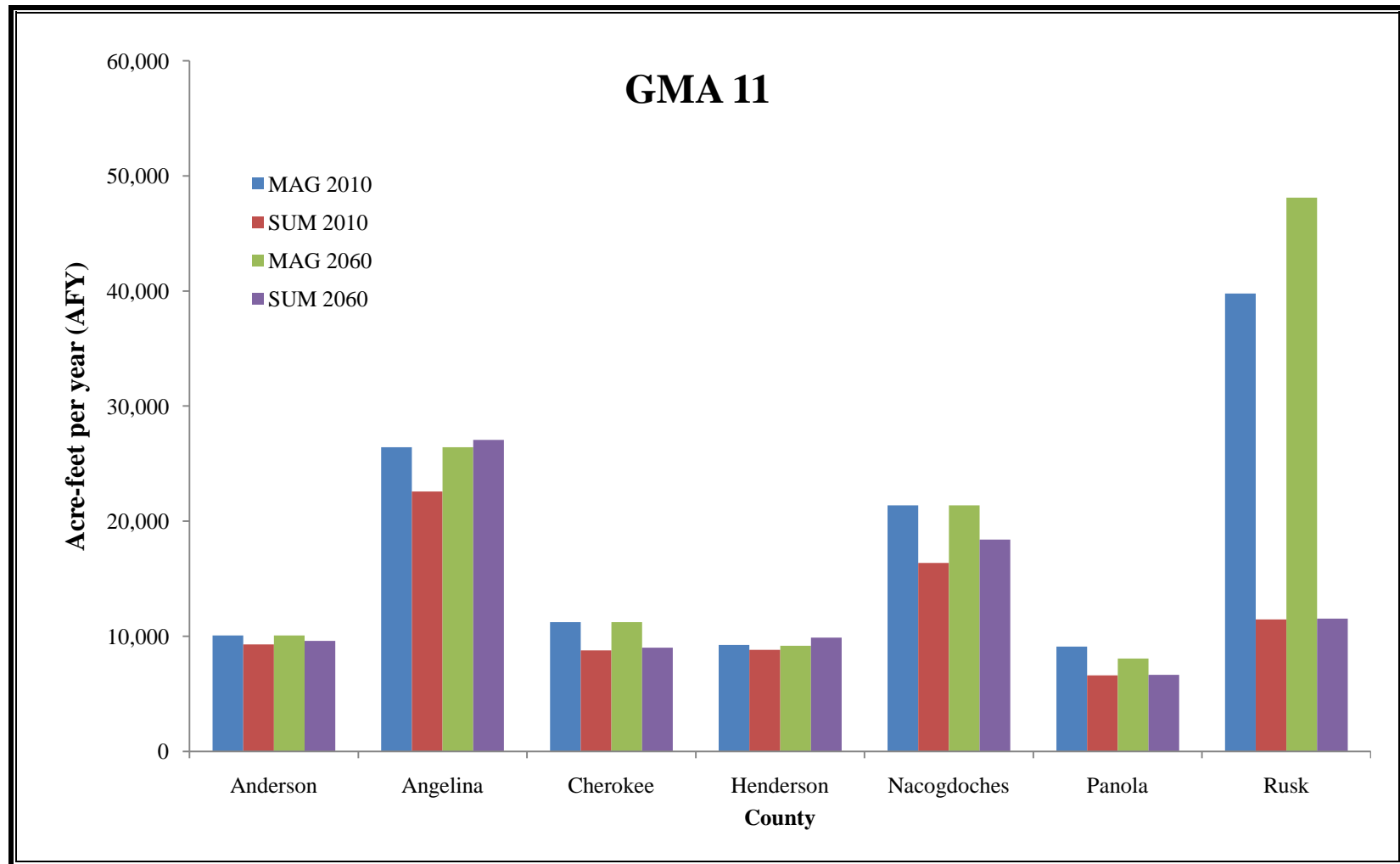


Figure 2: GMA 11 comparison of sum of currently available water supplies and water management strategies included in the 2011 regional water plans to the estimates of MAG resulting from the recently completed joint planning process for counties inside a GCD

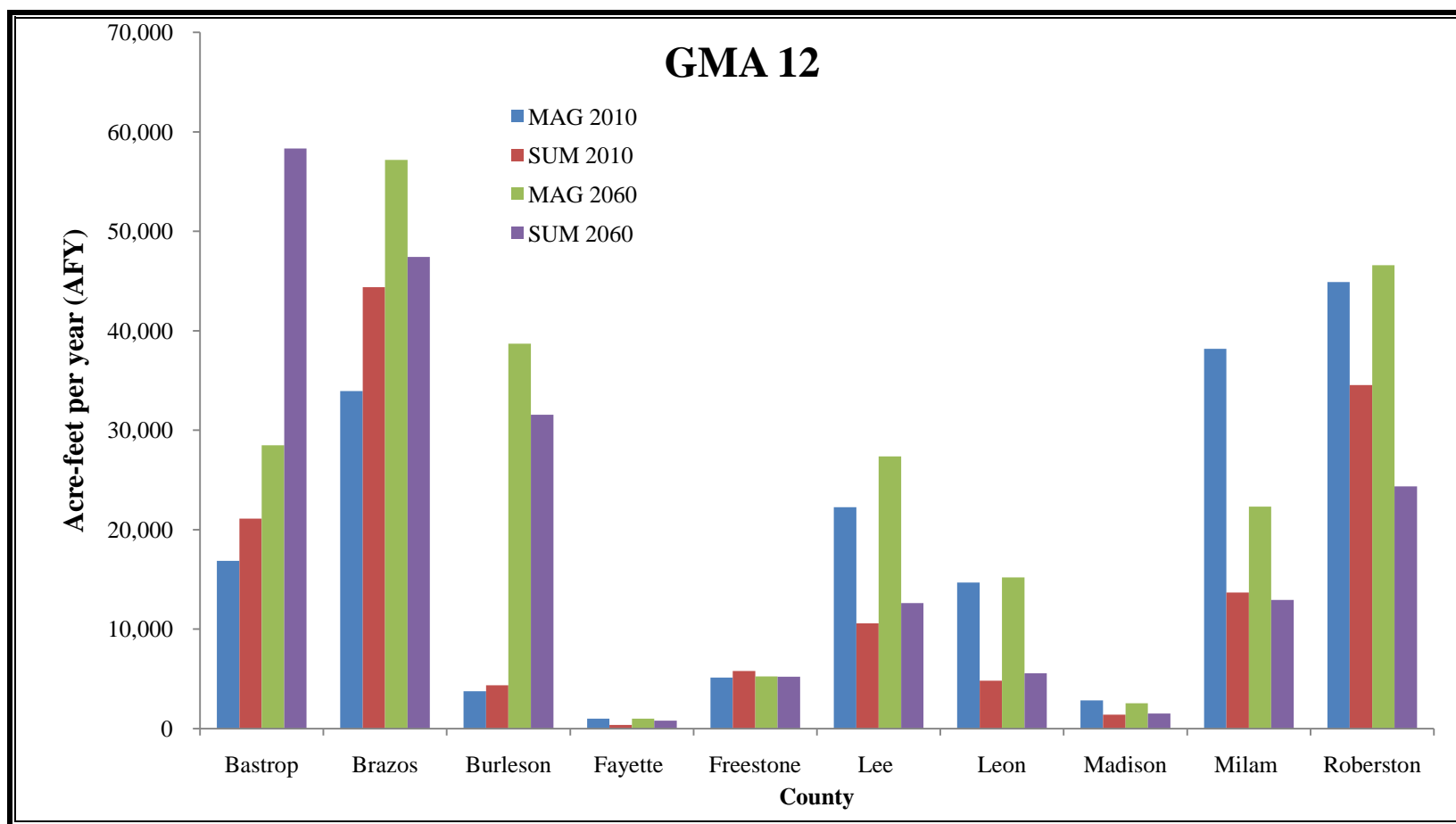


Figure 3: GMA 12 comparison of sum of currently available water supplies and water management strategies included in the 2011 regional water plans to the estimates of MAG resulting from the recently completed joint planning process for counties inside a GCD

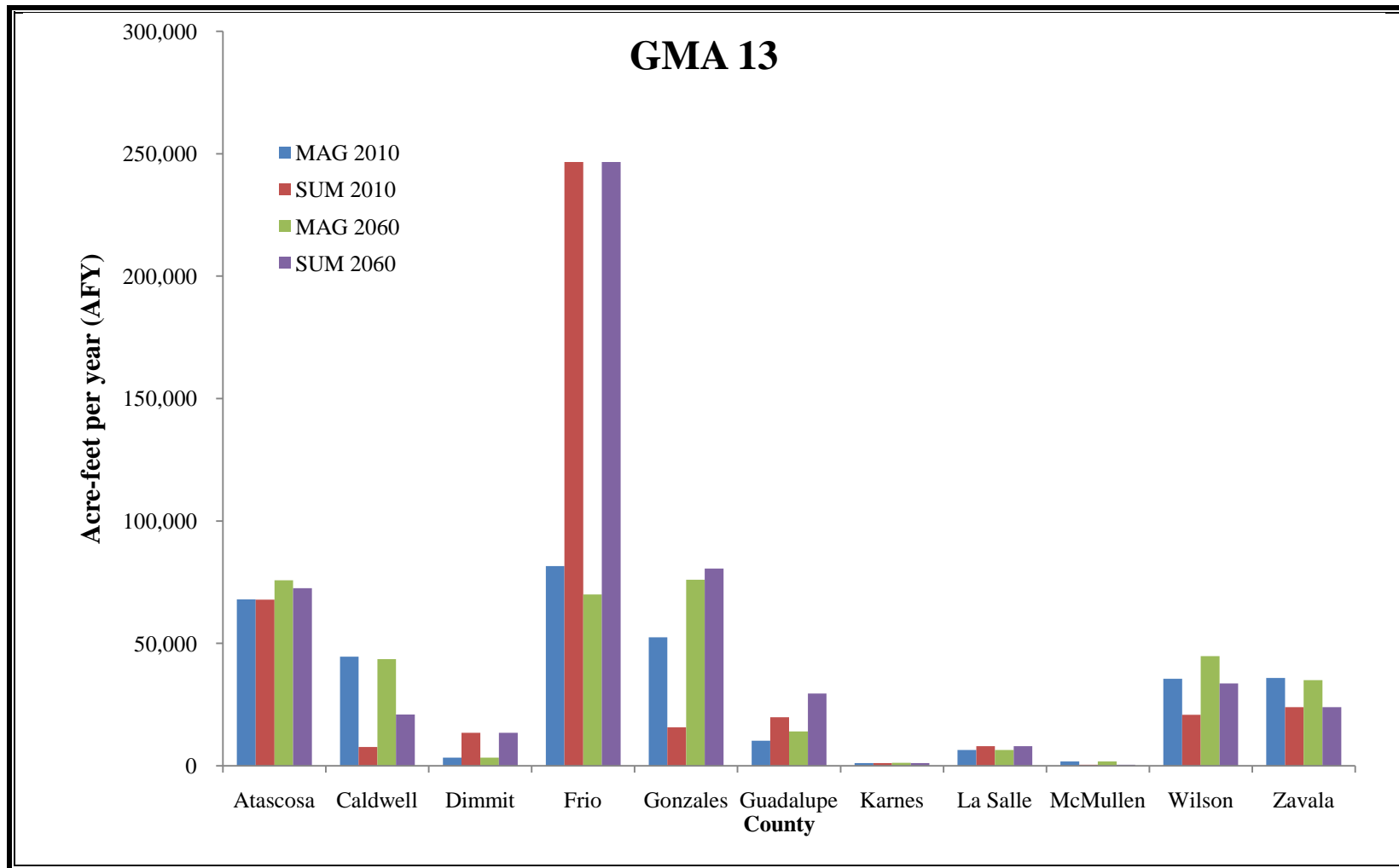


Figure 4: GMA 13 comparison of sum of currently available water supplies and water management strategies included in the 2011 regional water plans to the estimates of MAG resulting from the recently completed joint planning process for counties inside a GCD

Table 4: Comparison of draft estimates of MAG from first round of joint planning with sum of currently available supplies and water management strategies recommended in recently adopted 2011 regional water plans. Due to the absence of quantified values for exempt use a, for the purposes of this report, the values for MAG equal the total amount of pumping consistent with the adopted DFC. A potential conflict, as defined in this study, exists when the sum of currently available supplies and water management strategies is greater than the MAG for any decade during the 50-year planning horizon. These instances are illustrated in this table in parentheses (xxxx), i.e. negative numbers. All values are in acre-feet per year.

Regional Water Planning Area (RWPA)	Groundwater Management Area (GMA)	County	Calculations	2010	2020	2030	2040	2050	2060
I	11	Anderson	MAG	10,077	10,077	10,077	10,077	10,077	10,077
		Anderson	Supplies + Strategies	9,291	9,393	9,514	9,614	9,614	9,614
			<u>Difference</u>	786	684	563	463	463	463
I	11	Angelina	MAG	26,414	26,414	26,414	26,414	26,414	26,414
		Angelina	Supplies + Strategies	22,569	22,533	24,339	24,599	26,679	27,051
			<u>Difference</u>	3,845	3,881	2,075	1,815	(265)	(637)

Table 4: Continued

L	13	Atascosa	MAG	67,949	68,776	70,369	71,947	73,786	75,808
		Atascosa	Supplies + Strategies	67,872	69,043	69,921	69,987	70,051	72,526
			<u>Difference</u>	77	(267)	448	1,960	3,735	3,282
K	12	Bastrop	MAG	16,866	19,979	20,666	24,833	28,018	28,498
		Bastrop	Supplies + Strategies	21,129	31,489	38,622	46,388	54,275	58,321
			<u>Difference</u>	(4,263)	(11,510)	(17,956)	(21,555)	(26,257)	(29,823)
N	15&16	Bee	Supplies + Strategies	380	394	394	394	394	394
L	13	Bexar	MAG	26,278	26,278	26,278	26,278	26,278	26,107
		Bexar	Supplies + Strategies	15,916	16,264	12,987	12,993	13,000	13,006
			<u>Difference</u>	10,362	10,014	13,291	13,285	13,278	13,101

Table 4: Continued

D	11	Bowie	MAG	11,126	8,216	7,976	7,533	7,533	7,083
		Bowie	Supplies + Strategies	4,153	4,296	4,365	4,365	4,194	4,053
			<u>Difference</u>	6,973	3,920	3,611	3,168	3,339	3,030
G	12	Brazos	MAG	33,925	38,835	44,847	49,421	53,970	57,169
		Brazos	Supplies + Strategies	44,380	44,502	44,386	47,432	47,439	47,434
			<u>Difference</u>	(10,455)	(5,667)	461	1,989	6,531	9,735
G	12	Burleson	MAG	3,750	23,249	28,047	32,518	36,492	38,701
		Burleson	Supplies + Strategies	4,369	4,369	4,669	27,433	30,053	31,557
			<u>Difference</u>	(619)	18,880	23,378	5,085	6,439	7,144
L	13	Caldwell	MAG	44,546	44,546	44,137	44,137	43,561	43,561
		Caldwell	Supplies + Strategies	7,706	11,718	18,676	16,902	18,108	20,997
			<u>Difference</u>	36,840	32,828	25,461	27,235	25,453	22,564

Table 4: Continued

D	11	Camp	MAG	4,041	4,041	4,041	4,041	4,041	4,041
		Camp	Supplies + Strategies	2,071	2,077	2,083	2,088	2,093	2,098
			<u>Difference</u>	<i>1,970</i>	<i>1,964</i>	<i>1,958</i>	<i>1,953</i>	<i>1,948</i>	<i>1,943</i>
D	11	Cass	MAG	3,533	3,533	3,533	3,533	3,533	3,533
		Cass	Supplies + Strategies	3,258	3,294	3,375	3,457	3,527	3,527
			<u>Difference</u>	<i>275</i>	<i>239</i>	<i>158</i>	<i>76</i>	<i>6</i>	<i>6</i>
I	11	Cherokee	MAG	11,222	11,222	11,222	11,222	11,222	11,222
		Cherokee	Supplies + Strategies	8,774	8,821	8,872	8,927	8,973	9,016
			<u>Difference</u>	<i>2,448</i>	<i>2,401</i>	<i>2,350</i>	<i>2,295</i>	<i>2,249</i>	<i>2,206</i>
L	15	Dewitt	Supplies + Strategies	71	71	71	71	71	71

Table 4: Continued

L	13	Dimmit	MAG	3,359	3,359	3,359	3,359	3,359	3,359
		Dimmit	Supplies + Strategies	13,536	13,536	13,536	13,536	13,536	13,536
			<u>Difference</u>	<i>(10,177)</i>	<i>(10,177)</i>	<i>(10,177)</i>	<i>(10,177)</i>	<i>(10,177)</i>	<i>(10,177)</i>
L	12	Falls	MAG	865	867	875	884	895	895
		Falls	Supplies + Strategies	667	667	667	667	667	667
			<u>Difference</u>	<i>198</i>	<i>200</i>	<i>208</i>	<i>217</i>	<i>228</i>	<i>228</i>
K	12	Fayette	MAG	1,000	1,000	1,000	1,000	1,000	1,000
		Fayette	Supplies + Strategies	380	453	542	611	690	803
			<u>Difference</u>	<i>620</i>	<i>547</i>	<i>458</i>	<i>389</i>	<i>310</i>	<i>197</i>

Table 4: Continued

D	11	Franklin	MAG	9,746	9,484	9,484	9,484	9,484	9,484
		Franklin	Supplies + Strategies	1,677	1,651	1,644	1,637	1,617	1,597
			<u>Difference</u>	8,069	7,833	7,840	7,847	7,867	7,887
C	12	Freestone	MAG	5,138	5,305	5,317	5,315	5,262	5,259
		Freestone	Supplies + Strategies	5,783	5,223	5,223	5,223	5,223	5,223
			<u>Difference</u>	(645)	82	94	92	39	36
L	13	Frio	MAG	81,551	79,089	76,734	74,439	72,222	70,030
		Frio	Supplies + Strategies	246,645	246,645	246,645	246,645	246,645	246,645
			<u>Difference</u>	(165,094)	(167,556)	(169,911)	(172,206)	(174,423)	(176,615)
L	13	Gonzales	MAG	52,483	62,316	70,317	75,791	75,970	75,970
		Gonzales	Supplies + Strategies	15,740	35,648	44,928	55,561	67,821	80,540
			<u>Difference</u>	36,743	26,668	25,389	20,230	8,149	(4,570)

Table 4: Continued

D	11	Gregg	MAG	7,649	7,649	7,649	7,649	7,649	7,649
		Gregg	Supplies + Strategies	5,621	5,707	5,847	6,281	6,560	7,038
			<u>Difference</u>	2,028	1,942	1,802	1,368	1,089	611
G	14	Grimes	Supplies + Strategies	236	226	221	217	217	217
L	13	Guadalupe	MAG	10,241	10,833	11,283	13,021	13,541	14,041
		Guadalupe	Supplies + Strategies	19,832	23,162	25,779	26,384	28,029	29,570
			<u>Difference</u>	(9,591)	(12,329)	(14,496)	(13,363)	(14,488)	(15,529)
D	11	Harrison	MAG	8,911	8,837	8,786	8,698	8,683	8,639
		Harrison	Supplies + Strategies	5,332	5,786	6,042	6,258	6,601	6,959
			<u>Difference</u>	3,579	3,051	2,744	2,440	2,082	1,680
C&I	11	Henderson	MAG	9,253	9,186	9,186	9,186	9,186	9,186
		Henderson	Supplies + Strategies	8,833	9,565	9,567	9,851	9,853	9,895
			<u>Difference</u>	420	(379)	(381)	(665)	(667)	(709)

Table 4: Continued

D	11	Hopkins	MAG	3,433	3,391	3,391	3,391	3,391	3,391
		Hopkins	Supplies + Strategies	2,227	2,234	2,237	2,238	2,232	2,226
			<u>Difference</u>	1,206	1,157	1,154	1,153	1,159	1,165
11	C&I	Houston	MAG	5,356	5,356	5,356	5,356	5,356	5,356
		Houston	Supplies + Strategies	2,272	2,655	2,765	3,397	3,852	4,358
			<u>Difference</u>	3,084	2,701	2,591	1,959	1,504	998
13	L	Karnes	MAG	1,059	1,117	1,182	1,231	1,259	1,280
		Karnes	Supplies + Strategies	1,141	1,141	1,141	1,141	1,141	1,141
			<u>Difference</u>	(82)	(24)	41	90	118	139
13	L	La Salle	MAG	6,454	6,454	6,454	6,454	6,454	6,454
		La Salle	Supplies + Strategies	8,013	8,013	8,013	8,013	8,013	8,013
			<u>Difference</u>	(1,559)	(1,559)	(1,559)	(1,559)	(1,559)	(1,559)

Table 4: Continued

G	12	Lee	MAG	22,259	24,023	23,402	24,624	26,827	27,380
		Lee	Supplies + Strategies	10,584	10,987	10,987	10,988	8,913	12,619
			<u>Difference</u>	<i>11,675</i>	<i>13,036</i>	<i>12,415</i>	<i>13,636</i>	<i>17,914</i>	<i>14,761</i>
H	12	Leon	MAG	14,682	14,475	14,647	14,892	15,172	15,196
		Leon	Supplies + Strategies	4,818	5,128	5,334	5,407	5,459	5,558
			<u>Difference</u>	<i>9,864</i>	<i>9,347</i>	<i>9,313</i>	<i>9,485</i>	<i>9,713</i>	<i>9,638</i>
G	8&12	Limestone	MAG	11,321	11,306	11,436	11,616	11,918	11,918
		Limestone	Supplies + Strategies	7,403	7,591	7,780	7,968	8,157	8,347
			<u>Difference</u>	<i>3,918</i>	<i>3,715</i>	<i>3,656</i>	<i>3,648</i>	<i>3,761</i>	<i>3,571</i>
N	16	Live Oak	Supplies + Strategies	60	60	60	60	60	60
H	12	Madison	MAG	2,838	2,859	2,768	2,654	2,552	2,542
		Madison	Supplies + Strategies	1,409	1,493	1,571	1,551	1,518	1,518
			<u>Difference</u>	<i>1,429</i>	<i>1,366</i>	<i>1,197</i>	<i>1,103</i>	<i>1,034</i>	<i>1,024</i>

Table 4: Continued

D	11	Marion	MAG	2,077	2,077	2,077	2,077	2,077	2,077
		Marion	Supplies + Strategies	1,981	2,001	2,008	2,014	2,020	2,028
			<u>Difference</u>	96	76	69	63	57	49
M	13	Maverick	MAG	2,043	2,043	2,024	1,677	1,570	1,532
		Maverick	Supplies + Strategies	1,792	2,056	2,058	2,060	2,073	2,444
			<u>Difference</u>	251	(13)	(34)	(383)	(503)	(912)
G	8	McLennan	Supplies + Strategies	29	29	29	29	29	29
N	13	McMullen	MAG	1,819	1,819	1,819	1,819	1,819	1,819
		McMullen	Supplies + Strategies	430	438	442	446	450	453
			<u>Difference</u>	1,389	1,381	1,377	1,373	1,369	1,366
L	13	Medina	MAG	2,568	2,545	2,533	2,533	2,533	2,533
		Medina	Supplies + Strategies	7,597	7,597	7,597	7,597	7,597	7,597
			<u>Difference</u>	(5,029)	(5,052)	(5,064)	(5,064)	(5,064)	(5,064)

Table 4: Continued

G	12	Milam	MAG	38,183	23,923	20,206	19,112	21,359	22,319
		Milam	Supplies + Strategies	13,686	13,686	13,686	12,828	12,941	12,941
			<u>Difference</u>	24,497	10,237	6,520	6,284	8,418	9,378
D	11	Morris	MAG	2,616	2,616	2,558	2,558	2,558	2,558
		Morris	Supplies + Strategies	1,381	1,381	1,381	1,381	1,381	1,381
			<u>Difference</u>	1,235	1,235	1,177	1,177	1,177	1,177
I	11	Nacogdoches	MAG	21,385	21,385	21,385	21,385	21,385	21,385
		Nacogdoches	Supplies + Strategies	16,375	16,375	16,986	17,258	18,043	18,402
			<u>Difference</u>	5,010	5,010	4,399	4,127	3,342	2,983
C	12	Navarro	MAG	15	15	15	15	15	15
		Navarro	Supplies + Strategies	88	88	88	88	88	88
			<u>Difference</u>	(73)	(73)	(73)	(73)	(73)	(73)

Table 4: Continued

I	11	Panola	MAG	9,097	8,227	8,227	8,069	8,069	8,069
		Panola	Supplies + Strategies	6,609	6,615	6,623	6,631	6,639	6,649
			<u>Difference</u>	2,488	1,612	1,604	1,438	1,430	1,420
D	11	Rains	MAG	1,703	1,703	1,620	1,620	1,620	1,583
		Rains	Supplies + Strategies	785	809	822	825	823	820
			<u>Difference</u>	918	894	798	795	797	763
D	11	Red River	MAG	0	0	0	0	0	0
G	12	Robertson	MAG	44,886	45,435	45,814	46,238	46,582	46,583
		Robertson	Supplies + Strategies	34,552	34,562	34,567	24,349	24,348	24,347
			<u>Difference</u>	10,334	10,873	11,247	21,889	22,234	22,236
I	11	Rusk	MAG	39,772	42,188	50,336	46,940	48,128	48,119
		Rusk	Supplies + Strategies	11,478	11,459	11,441	11,578	11,555	11,526
			<u>Difference</u>	28,294	30,729	38,895	35,362	36,573	36,593

Table 4: Continued

I	11	Sabine	MAG	6,866	6,858	6,858	6,858	6,858	6,858
		Sabine	Supplies + Strategies	358	358	358	440	440	440
			<u>Difference</u>	6,508	6,500	6,500	6,418	6,418	6,418
I	11	San Augustine	MAG	1,781	1,781	1,781	1,781	1,781	1,781
		San Augustine	Supplies + Strategies	677	677	777	827	927	927
			<u>Difference</u>	1,104	1,104	1,004	954	854	854
I	11	Shelby	MAG	12,044	11,217	10,901	10,447	10,311	9,729
		Shelby	Supplies + Strategies	5,304	6,404	7,004	7,004	7,559	7,566
			<u>Difference</u>	6,740	4,813	3,897	3,443	2,752	2,163
D&I	11	Smith	MAG	33,249	33,249	33,249	33,239	33,225	33,225
		Smith	Supplies + Strategies	26,916	27,212	27,597	28,468	29,910	31,244
			<u>Difference</u>	6,333	6,037	5,652	4,771	3,315	1,981

Table 4: Continued

D	11	Titus	MAG	10,856	10,321	10,019	9,868	9,638	9,638
		Titus	Supplies + Strategies	5,214	6,379	6,959	7,391	7,628	8,503
			<u>Difference</u>	5,642	3,942	3,060	2,477	2,010	1,135
K	8,9, &10	Travis	Supplies + Strategies	1,499	1,718	1,901	2,025	2,153	2,300
H&I	11	Trinity	MAG	2,215	2,215	2,215	2,215	2,215	2,215
D	11	Upshur	MAG	7,115	7,115	7,115	7,115	7,115	7,115
		Upshur	Supplies + Strategies	6,610	6,697	6,756	6,799	6,835	6,885
			<u>Difference</u>	505	418	359	316	280	230
L	12	Uvalde	MAG	2,971	1,230	828	828	828	828
		Uvalde	Supplies + Strategies	2,846	2,846	2,846	2,846	2,846	2,846
			<u>Difference</u>	125	(1,616)	(2,018)	(2,018)	(2,018)	(2,018)

Table 4: Continued

D	11	Van Zandt	MAG	10,614	10,283	10,283	10,283	10,283	10,051
		Van Zandt	Supplies + Strategies	7,499	8,170	8,645	8,982	9,645	10,292
			<u>Difference</u>	3,115	2,113	1,638	1,301	638	(241)
M	13	Webb	MAG	916	916	916	916	916	916
		Webb	Supplies + Strategies	3,882	6,824	9,138	9,712	9,711	9,710
			<u>Difference</u>	(2,966)	(5,908)	(8,222)	(8,796)	(8,795)	(8,794)
G	12	Williamson	MAG	7	7	7	7	7	7
		Williamson	Supplies + Strategies	8,412	8,412	8,412	8,522	8,522	8,522
			<u>Difference</u>	(8,405)	(8,405)	(8,405)	(8,515)	(8,515)	(8,515)
L	13	Wilson	MAG	35,560	36,986	38,717	40,486	42,531	44,794
		Wilson	Supplies + Strategies	20,823	21,621	24,374	26,297	32,343	33,631
			<u>Difference</u>	14,737	15,365	14,343	14,189	10,188	11,163

Table 4: Continued

D	11	Wood	MAG	21,716	21,539	21,451	21,408	21,333	21,311
		Wood	Supplies + Strategies	8,930	9,021	9,074	9,083	9,087	9,098
			<u>Difference</u>	<i>12,786</i>	<i>12,518</i>	<i>12,377</i>	<i>12,325</i>	<i>12,246</i>	<i>12,213</i>
L	13	Zavala	MAG	35,859	35,859	35,521	35,388	35,288	34,969
		Zavala	Supplies + Strategies	23,935	23,935	23,935	23,935	23,935	23,935
			<u>Difference</u>	<i>11,924</i>	<i>11,924</i>	<i>11,586</i>	<i>11,453</i>	<i>11,353</i>	<i>11,034</i>

Table 5: Summation of differences between the sum of currently available supplies and water management strategies for the Carrizo-Wilcox Aquifer in the county and decade referenced in the 2011 regional water plans compared to the total amount of pumping consistent with the DFC (or for the purposes of this report as discussed earlier, the MAG). In these cases where the *Difference* value is negative(xxx), for the decade referenced, a potential conflict exists. This comparison is only for counties in GMA 11, 12, and 13 that are within the jurisdictional boundaries of a GCD. All values are in acre-feet per year.

GMA	Difference is (+) 2010	Difference is (-) 2010	Net 2010	Difference is (+) 2060	Difference is (-) 2060	Net 2060
11	43,291	0	43,291	43,665	1,346	42,319
12	58,419	15,982	42,437	74,149	29,823	88,652
13	101,710	186,503	(84,793)	49,548	208,450	(158,902)
Total	203,420	202,485	935	167,362	239,619	(27,931)

Table 6: County-level sum of water management strategies in the 2011 regional water plans that are based on the use of brackish groundwater from the Carrizo-Wilcox Aquifer. All values are in acre-feet per year.

County	2010	2020	2030	2040	2050	2060
Bexar	0	12,000	21,750	27,150	27,903	27,903
Comal	0	0	880	880	1,762	1,762
Guadalupe	0	0	1,630	1,630	4,203	4,203
Hays	0	0	336	336	1,728	1,728
Maverick	0	260	260	260	272	641
Wilson	0	0	0	1,120	1,120	1,120
Total	0	12,260	24,856	31,376	36,988	37,357

Chapter 5: Characterized GCD Plans with Respect to Their Ability to Conserve and Protect the Aquifer. Compare Each GCD's Plans, Rules and Procedures with Those of Each Adjacent GCD for Compatibility

Chapter 5 was written to “*Characterize Groundwater Conservation District (GCD) plans with respect to their ability to conserve and protect the aquifer. Compare each GCD's plans, rules and procedures with those of each adjacent GCD for compatibility.*”

Chapter 5 evaluates GCD management plans, rules, and procedures in order to characterize GCD plans with respect to their ability to conserve and protect the aquifer. We compared each GCD's plans, rules and procedures with those of each adjacent GCD for compatibility. The complete responses provided by the 16 GCDs that submitted requested information to the study's survey questionnaire are available for review at the Carrizo-Wilcox Aquifer Study website at <http://www.beg.utexas.edu/cswr/aquiferstudy/>. The remaining five GCD management plans and rules were acquired from the Texas Water Development Board (TWDB) and from district websites.

We reviewed 20 complete sets of management plans and rules in order to evaluate and link specific plans, rules, and procedures that support the GCDs' ability to conserve and protect the Carrizo-Wilcox Aquifer. One additional management plan for Anderson County Underground Water Conservation District was obtained from the TWDB, but no rules were available.

Programs developed by Carrizo-Wilcox GCDs to conserve and protect the groundwater resources under their jurisdiction vary greatly: from simple to complex, from narrow to broad in scope, and from passive to aggressive. During review, the

compatibility of programs designed to conserve and protect groundwater resources within groundwater management areas, between neighboring Carrizo-Wilcox GCDs, and between Carrizo-Wilcox GCDs and adjacent counties that are not under the jurisdiction of a GCD were evaluated. Solely based on a review of groundwater management plans and rules, no compatibility issues were identified within groundwater management areas and between existing Carrizo-Wilcox GCDs. However, there will always be the potential for conflict and incompatibility between adjacent counties where one county is within a GCD and a neighboring county is not. Progressive conservation of groundwater resources through programs developed and implemented in a GCD management plan can and has led to economic development shifting to neighboring counties that are not in a GCD. Potential incompatibility may also occur between existing, adjacent Carrizo-Wilcox GCDs that have significantly different approaches to permitting strategies, for example. However, compatibility issues resulting from disparate permitting strategies are not discernible solely from a review of management plans.

5.1 GCD Management Plans and Rules Supporting Conservation and Protection Programs

According to Section 36.1071 of the Texas Water Code (TWC), GCDs are to develop and implement groundwater management plans, “...*develop a comprehensive management plan which addresses the following management goals, as applicable.*” Therefore, we reviewed seven of the eight management goals required for a management plan, excluding the management goal requiring a GCD to establish their desired future conditions of aquifers within their jurisdictional boundaries because they have only very

recently been adopted and management plans have not been amended to implement adopted desired future conditions at this point in time.

The following management goals were reviewed:

1. Providing the most efficient use of groundwater (TWC §36.1071(a)(1));
2. Controlling and preventing waste of groundwater (TWC §36.1071(a)(2));
3. Controlling and preventing subsidence (TWC §36.1071(a)(3));
4. Addressing conjunctive surface water management issues (TWC §36.1071(a)(4));
5. Addressing natural resource issues (TWC §36.1071(a)(5));
6. Addressing drought conditions (TWC §36.1071(a)(6));
7. Addressing conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, or brush control, where appropriate and cost-effective (TWC §36.1071(a)(7)).

In order to accomplish this task, the survey requested specific information from the GCDs in the online survey developed for this study. The requests were as follows (a subset of total online survey):

- *Number 13 - Provide an electronic copy of the District's current adopted management plan.*
- *Number 14 - Provide an electronic copy of the District's current adopted rules.*
- *Number 15 - Provide an electronic copy of any written procedures or guidelines for operational purposes that have been developed and adopted by the District.*
- *Number 21 - Summarize significant programs included in the District's management plan specifically designed to conserve and protect the Carrizo-Wilcox Aquifer.*

According to the survey results, 15 of the 16 GCDS addressed question 21 which requested each district to “*Summarize significant programs included in the District's*

*management plan specifically designed to conserve and protect the Carrizo-Wilcox Aquifer.” Six of the GCDs, including Panola County GCD, Rusk County GCD, Fayette County GCD, Gonzales County GCD, Post Oak Savannah GCD, and Brazos GCD provided summaries of programs included in their management plans that have been designed to conserve and protect the Carrizo-Wilcox Aquifer. Other districts responded to the Survey with more abbreviated descriptions of programs designed to preserve and protect that Carrizo-Wilcox Aquifer. For example, Lost Pines GCD stated “*The District’s Management Plan is self-explanatory. In addition, though, LPGCD engages in public education through presentations at elementary schools within the District, county commissioners’ courts, various civic associations, Bastrop and Lee counties’ Emergency Management Services, the WSCS, and environmental groups such as Lee County Wildlife Association, Bastrop County Audubon Society. To the extent possible, all requests for presentations are honored.*” Medina County GCD stated that. “*Well level monitoring; annual use reports for all non-exempt wells; and production limits of 2 acre feet*” as the programs implemented by the District to conserve and protect the Carrizo-Wilcox Aquifer. Wintergarden GCD stated “*Series of well monitors monitoring water levels.*” Plum Creek GCD stated: “*Many of our management goals: 10.1 efficient use of groundwater, 10.2 controlling and preventing waste of groundwater, 10.4 conjunctive use of surface and groundwater, 10.6, natural resource issues, 10.7 conservation, and 10.8 mitigation are all important and are designed to conserve and protect the Carrizo-Wilcox Aquifer. Significant, as far as resource allocation, is the monitoring well observation program in which we have already budgeted for 4 In-situ 24/7 units and will**

probably have to purchase more in the future.” Each of the districts’ independently developed management plans to address conservation and protection of the aquifer. The districts’ methodologies and metrics were broad and varied in how they addressed the need to conserve and protect the Carrizo-Wilcox Aquifer within their respective jurisdictions.

5.2 Providing the Most Efficient Use of Groundwater

All 21 GCDs addressed the management goal, “*providing the most efficient use of groundwater,*” in their management plans. The nature and scope of management objectives and performance standards varied greatly among the 21 Carrizo-Wilcox GCD’s throughout Groundwater Management Areas 11, 12, and 13. Appendix is a complete matrix of management goals, objectives, and performance standards currently included in the 21 Carrizo-Wilcox GCD management plans. Approaches to providing the most efficient use of groundwater, if achieved, within the GCDs were varied, largely because of diverse regional socio-economic and developmental pressures and environmental concerns represented in the three different groundwater management areas and 21 GCDs.

The Carrizo-Wilcox GCDs have established objectives and performance standards that are geared towards influencing the public’s perception and consumption practices through education, collection of basic groundwater data for use during development of policy or regulations, and taking physical steps to regulate groundwater consumption via establishment of well permitting, registration, and metering programs. These soft and hard policy measures have been developed by the individual Carrizo-Wilcox GCD

Boards of Directors to satisfy the management goal requirement to provide for the most efficient use of groundwater. For example, the Uvalde County GCD listed two management objectives and companion performance standards. The Uvalde County GCD Management Plan states that, “*Each year the District will make available educational brochures to the public promoting and explaining conservation methods and concepts, on at least one occasion,*” and the companion performance standard stating, “*The District will make educational material available at least one time per year through service organizations, and on a continuing basis at the District Office.*” The second management objective stated, “*Each year, the District will provide informative speakers to school and civic groups to raise public awareness of practices that ensure the efficient use of groundwater,*” and the companion performance standard stating, “*Each year, the District will make at least two public speaking appearances to promote efficient use of groundwater.*”

The Rusk County GCD Management Plan includes a management objective that, if achieved, would “*Establish a Groundwater Database for all water wells in the District. The database shall include information relating to well location, production volume, and other information deemed necessary by the District to enable effective monitoring of groundwater in Rusk County,*” and a companion performance standard that states the District will, “*Document all new and existing wells by 2010. Tracking method – each year the number of new and existing groundwater wells added to the database will be presented in the Annual Report submitted to the Board of Directors of the District.*” Some GCDs clearly have more comprehensive management objectives and performance

standards than other GCDs. For instance, the Evergreen GCD listed four management objectives that included monitoring the “*volume of water produced from nine irrigation wells and make note of the crops irrigated by the wells to promote water conservation in irrigation practices,*” and stated that “*Each month the District will monitor the volume of water produced by 35 municipal and rural water suppliers in the District.*” The Evergreen GCD also references other metrics for achieving this management goal, such as requesting production data from “*the operators of 800 agricultural irrigation wells in the District.*” The phrase “most efficient use” has clearly been viewed differently within the various Carrizo-Wilcox GCDs. Land owners and Boards of Directors in East Texas may perceive the use of groundwater in surface ponds as economically beneficial and efficient whereas landowners in South-Central Texas may find that development and transport of groundwater resources to metropolitan areas to be the most efficient use of their groundwater resources.

Table 7 is a compilation of all management objectives and performance standards included in the Carrizo-Wilcox GCD management plans providing the most efficient use of groundwater.

#	<p>Table 7: Providing the Most Efficient Use of Ground Water</p> <p>MOB= Management Objective PS=Performance Standard</p>
1	<p>Anderson Groundwater Conservation District</p> <p>MOB: The District will begin a process to register all wells within the District's jurisdiction.</p> <p>PS: Each year, beginning in FY09, the number of new and existing wells registered with the District will be presented in the District's annual report</p>
2	<p>Bee Groundwater Conservation District</p> <p>MOB: Each year the District will provide education materials concerning the efficient use of groundwater.</p> <p>PS: Provide educational materials to at least one school annually</p>
3	<p>Bluebonnet Groundwater Conservation District</p> <p>MOB: Each year, the District will require all new exempt or non-exempt wells that are constructed within the boundaries of the District to be registered with the District in accordance with the District rules.</p> <p>PS: Each Year the number of exempt and non-exempt wells registered by the District for the year will be incorporated into the Annual Report submitted to the Board of Directors of the District.</p>

#	Table 7: Continued
4	<p>Brazos Valley Groundwater Conservation District</p> <p>MOB: Require all existing and new non-exempt wells constructed within the boundaries of the District to be permitted by the District and operated in accordance with District Rules. In addition, the District will encourage all exempt wells constructed within the District boundaries to be registered with the District.</p> <p>PS: The number of exempt and permitted wells registered within the District will be reported annually in the District's Annual Report submitted to the Board of Directors of the District.</p> <p>MOB: Regulate the production of groundwater by permitting wells within the District's boundaries based on beneficial use and in accordance with District Rules. Each year the District will accept and process applications for the permitted use of groundwater in the District, in accordance with the permitting process established by District Rules. The District will regulate the production of groundwater from permitted wells by verification of pumpage volumes using meters, if meters are required under the District Rule and/or permit for the wells.</p> <p>PS: The number and type of applications made for the permitted use of groundwater in the District, the number and type of permits issued by the District, and the amount of groundwater permitted, will be included in the Annual Report given to the Board of Directors. The actual annual pumpage from each metered well within the District will be reported annually and compared to the amount permitted for that well. This information will be included in the District's Annual Report submitted to the Board of Directors of the District.</p> <p>MOB: Conduct ongoing monitoring of the aquifers underlying the District and the current groundwater production within the District, and then assess the available groundwater that can be produced from each aquifer within the District after sufficient data are collected and evaluated. Using this data and information developed for GMA-12 the District will re-evaluate availability goals as necessary and will permit wells in accordance with the appropriate production goals.</p> <p>PS: The District will conduct the appropriate studies to identify the issues and criteria needed to address groundwater management needs within the District's boundaries. Groundwater availability goals will take into consideration the GMA-12 Planning and research of the hydro-geologic and geologic characteristics of the aquifers, which may include, but not necessarily be limited to, the amount of water use, water quality, and water level declines. A progress report on the work of the District regarding the groundwater availability will be written annually, as substantial additional data are developed. The progress report will be included in the annual report to the District Board of Directors.</p>

#	Table 7: Continued
5	<p>Evergreen Underground Water Conservation District</p> <p>MOB: Each month the District will monitor the volume of water produced from nine irrigation wells and make note of the crops irrigated by the wells to promote water conservation in irrigation practices.</p> <p>PS: A table of the monthly meter readings from the nine irrigation wells and a discussion of the irrigation application rates for each type of crop irrigated by the nine wells monitored by the District will be included in the Annual Report on District Activities made to the Board of Directors each year.</p> <p>MOB: Each month the District will monitor the volume of water produced 35 municipal and Rural water suppliers in the District.</p> <p>PS: A table showing the monthly production volumes reported to the District by the Municipal and Rural water suppliers in the District will be included in the Annual Report on District Activities made to the Board of Directors each year.</p> <p>MOB: Each year the District will request production reports from the operators 800 agricultural irrigation wells in the District.</p> <p>PS: A copy of the request for production reports sent to the operators of agricultural irrigation wells will be included in the Annual Report on District Activities made to the Board of Directors each year. A table showing the production volumes reported to the District from the agricultural irrigation well operators in the District will be included in the Annual Report on District Activities made to the Board of Directors each year.</p> <p>MOB: Each month the District will measure the water levels in 45 water wells and will measure the water level of an additional 126 wells on an annual basis each year.</p> <p>PS: A table showing the monthly and a table showing the annual water level measurements made by the District will be included in the Annual Report on District Activities made to the Board of Directors each year.</p>

#	Table 7: Continued
6	<p>Fayette County Groundwater Conservation District</p> <p>MOB: <i>Establish a Water Level Monitoring Program</i>: Establish a water level monitoring network by first, identifying the wells to be monitored, and secondly, by annually measuring the depth to water in those wells; record all measurements and/or observations; enter all measurements into District's computer data base; file specific locations of wells in the District's filing system. Establish a baseline by using existing wells, preferably those for which the District already has some historical data, in all major and minor aquifers where wells are available.</p> <p>PS: Annually report to the Board of Directors on:</p> <ul style="list-style-type: none"> ◆ The percent of water level monitoring wells for which measurements were recorded each year. ◆ The number of data records entered into District's data base each year. ◆ The number of wells in the water level measurement network each year. ◆ The number of wells added to the network, if required, each year. <p>MOB: <i>Set and Enforce Maximum Allowable Production Limits</i>: Annually, the District will investigate all reports filed by District constituents, on forms provided by the District, regarding pumpage of groundwater in excess of the maximum production allowable under the District's rules. Investigation of each occurrence shall occur within 30 days of receiving the report. Each case will be remedied in accordance with District rules.</p> <p>PS: Annually report to the Board of Directors on:</p> <ul style="list-style-type: none"> ◆ The number of reports investigated each year. ◆ The average amount of time taken to investigate reports each year. ◆ The number of incidences where violations occurred and violators were required to change operations to be in compliance with District rules each year. <p>MOB: <i>Implement Well Permitting Process</i>: Issue water well drilling permits for the drilling and completion of non-exempt water wells in the District within 30 days of application, or as soon thereafter as possible. Randomly inspect new well drilling sites to be assured that the District's completion and spacing standards are met. Send written notification to the well owner if the well fails to meet standards within 30 days of inspection. The Board will vote on final approval of the permit at the next scheduled meeting and insure that well completion standards have been met.</p> <p>PS: Annually report to the Board of Directors on:</p> <ul style="list-style-type: none"> ◆ The number of permits issued each year in Fayette County. ◆ The number of on-site inspections performed of all wells for which District staff has reason to question compliance with District rules. ◆ The number of permits field checked each year. ◆ The number of letters mailed to permit applicants requesting applicant to provide additional information or make changes to comply with District rules. ◆ The number of these letters which result in changes to comply with District rules and the number of cases still open at year-end.

#	Table 7: Continued
7	<p>Gonzales County Groundwater Conservation District</p> <p>MOB: The District will register at least 20 exempt wells annually and will compile 100 percent of the data in a database within 30 working days.</p> <p>PS: Record the date and number of exempt wells registered annually, the percentage of exempt wells that were entered into the database, and the number of days before the data was entered.</p> <p>MOB: The District will measure water levels in 20 wells three times a year in western Gonzales County within the same 60 day period and will compile 100 percent of the water level data into a database within 30 working days.</p> <p>PS: Record the date and number of wells measured, the percent of collected water level data that was entered into the database and the number of days before the data was entered.</p> <p>MOB: The District will measure water levels in 20 wells three times a year in eastern Gonzales County within the same 60 day period and will compile 100 percent of the water level data into a database within 30 working days.</p> <p>PS: Record the date and number of wells measured, the percent of collected water level data that was entered into the database and the number of days before the data was entered.</p> <p>MOB: The District will meet with the cities of Gonzales, Nixon, Smiley and Waelder, at least once a year, to inform the cities on water availability for economic development. The District will provide input on 100 percent of requests for information within 30 days of the request.</p> <p>PS: Record the date and number of meetings with each city. Record number of requests for information from each city, the number of responses to each city, and the number of days required to respond to each request for information.</p> <p>MOB: The District will attend all Groundwater Management Area (GMA) 13 meetings annually. The District will provide input on 100 percent of the requests for information within 30 days.</p>

#	Table 7: Continued
7	<p>Gonzales County Groundwater Conservation District Continued.</p> <p>PS: Record the number of GMA meetings posted annually, the number of GMA 13 meetings attended annually, the number of requests for information made by GM A 13, the number of responses to requests for information by GMA 13, the number of days required for each response to GMA 13 requests for information.</p> <p>MOB: The District will meet with the Gonzales Area Development Corporation (GADC), at least once a year, to inform the GADC on water availability for economic development. The District will provide input on 100 percent of requests for information within 30 days of the request.</p> <p>PS: Record the date and number of meetings with the GADC. Record the number of requests for information from the GADC, the number of responses given to the GADC, and the number of days required to respond to each request for information.</p> <p>MOB: The District will gather water production data from at least 4 public water suppliers annually and will compile 100 percent of these figures into a database of groundwater usage within 30 working days of receipt in order to better project the needs of the District.</p> <p>PS: Record the number of public suppliers from which water production data was collected annually, the percent of collected water production data that was entered into the database, and the number of days before the data was entered.</p> <p>MOB: The District will gather water production data from at least 10 irrigation wells and 5 livestock production facilities annually and will compile 100 percent of these figures into a database of groundwater usage within 30 working days of receipt in order to project future water use.</p> <p>PS: Record the number of irrigation wells and number livestock production facilities from which water production data was collected annually, the percent of collected water production data that was entered into the database, and the number of days before the data was entered.</p>

#	Table 7: Continued
8	<p>Guadalupe County Groundwater Conservation District</p> <p>MOB: District will establish a Carrizo-Wilcox aquifer water-level observation well program with a minimum of nine (9) observation wells. The nine observation wells will be measured twice annually, in January and September.</p> <p>PS: Number of times the wells are measured per year. The water level database will be maintained by the District office.</p>
9	<p>Live Oak Underground Water Conservation District</p> <p>MOB: School education: (a) Provide speakers to address water topics. (b) Distribute water resource education packets for use in the classroom.</p> <p>PS: Contact teacher or principle of 1 school annually.</p> <p>MOB: Farm education: (a) Provide speakers to address water topics at farm meetings (b) Distribute water resource education packets to farm leaders and farmers</p> <p>PS: Contact 1 farm group annually.</p> <p>MOB: Home Education: (a) Provide speakers to address water topics (b) Distribute water resource education packets to community people</p> <p>PS: Contact 1 civic group annually.</p>
10	<p>Lost Pines Groundwater Conservation District</p> <p>MOB: To inform the residents of Bastrop and Lee counties about the efficient use of groundwater. Such information may be related to irrigation efficiency, transmission losses, xeriscaping, or any other related subject deemed appropriate by the LPGCD board. The information on efficient use of groundwater may be disseminated in conjunction with information on controlling and preventing waste of groundwater and/or water conservation.</p> <p>PS: At least annually, the General Manager shall cause to be published in one or more newspapers of general circulation in Bastrop and Lee counties an article on efficient use of groundwater. The article on efficient use of groundwater may be published in conjunction with an article on controlling and preventing waste of groundwater and/or water conservation. In addition, to the extent practical, the LPGCD will sponsor or co-sponsor workshops open to the public that address this issue and similar issues.</p>
11	<p>McMullen Groundwater Conservation District</p> <p>MOB: Each year the District will provide education materials concerning the efficient use of groundwater</p> <p>PS: Provide educational materials to at least one school annually.</p>
12	<p>Medina County Groundwater Conservation District</p> <p>MOB: Each year, the District will provide informative speakers to schools and civic groups to raise public awareness of practices which ensure the efficient use of groundwater.</p> <p>PS: The District will make at least 2 public speaking appearances to promote the efficient use groundwater per year.</p>

#	Table 7: Continued
13	<p>Mid-East Groundwater Conservation District</p> <p>MOB: The District will at least once annually conduct at least one program to provide public information and education to promote the efficient use of groundwater. Such programs may include newspaper publication, open meetings, handout brochures and mail-out brochures.</p> <p>PS: The District will document the number of times this activity was completed in the annual report to the Board of Directors and maintain a record of the above for subsequent audits.</p>
14	<p>Neches & Trinity Valleys Groundwater Conservation District</p> <p>MOB: Each year the District will require the registration of all new wells drilled within the District's jurisdiction and the District will require a permit for drilling all non-exempt wells.</p> <p>PS: At all regularly scheduled Board meetings, the General Manager reports to the Board of Directors on the number of new wells registered with the District and the number of permit applications received and approved for new wells within the District.</p>
15	<p>Panola County Groundwater Conservation District</p> <p>MOB: Beginning in 2008, the District will require the registration of all wells within the District's boundaries each year.</p> <p>PS: The number of new and existing wells registered with the District will be provided in the Annual Report for each fiscal year.</p> <p>MOB: The District will require permits for all non-exempt groundwater use within District boundaries pursuant to the District Rules each year.</p> <p>PS: The District will accept and process applications for permits for all non-exempt groundwater use pursuant to the permitting process described in the District Rules each year. The Annual Report for each fiscal year will contain a summary of the number of applications for the permitted use of groundwater and the number and type of permits issued.</p>
16	<p>Pineywoods Groundwater Conservation District</p> <p>MOB: Each year, beginning in FY2002, the District will require the registration of all new wells drilled within the District's jurisdiction and the District will require a permit for all non-exempt wells, new and existing.</p> <p>PS: Each month at regularly scheduled meetings the General Manager reports to the District Board of Directors the number of new and existing wells registered with the District and the number of applications received for new wells within the District.</p>

#	Table 7: Continued
17	<p>Plum Creek Conservation District</p> <p>MOB: 1. The District will establish the PCCD Aquifer Water Level Observation Well Program with at least 6 observation wells located according to management zones within the District, and measure those wells at least once quarterly.</p> <p>2. The District will provide educational leadership to citizens within the District concerning this subject. The activity will be accomplished annually through at least one printed publication, such as a brochure, and public speaking at service organizations and public schools as provided for in the District's Public Education Program.</p> <p>3. The District will use its best efforts to obtain information on water being produced from areas in Caldwell County that are outside the boundaries of the District.</p> <p>4. The District will use its best efforts to obtain information on groundwater being produced from groundwater aquifers in counties surrounding the District as well as in areas close to the District that are not in groundwater districts to develop information about impacts of such production on groundwater in the District.</p> <p>PS: Establish the PCCD Aquifer Water Level Observation Well Program and its criteria, and begin quarterly measurements of at least 6 of the observation wells within one year following the adoption and certification of this plan.</p> <p>2. Water levels at these observation wells will be measured a minimum of once quarterly.</p> <p>3. PCCD representatives will circulate at least one publication and notice speaking appearances each year.</p> <p>4. PCCD representatives will attend and participate in GMA meetings appropriate to the District's regulatory authority.</p> <p>5. PCCD will periodically seek information from nearby groundwater districts not in the same GMA but drawing from the same aquifers regulated by the District.</p>
18	<p>Post Oak Savannah Groundwater Conservation District</p> <p>MOB: The District will establish the POSGCD Aquifer Water Level Observation Well Program with at least 10 observation wells located according to management zones within the District, and measure those wells at least once annually.</p> <p>PS: Establish the POSGCD Aquifer Water Level Observation Well Program and its criteria, and begin measurements of at least 10 of the observation wells within one year following the adoption and certification of this plan. Number of observation wells measured annually by the District. Water levels at these observation wells will be measured a minimum of once annually.</p> <p>MOB: The District will provide educational leadership to citizens within the District concerning this subject. The activity will be accomplished annually through at least one printed publication, such as a brochure, and public speaking at service organizations and public schools as provided for in the District's Public Education Program.</p> <p>PS: The number of publications and speaking appearances by the District each year under the District's Public Education Program.</p>

#	Table 7: Continued
19	<p>Rusk County Groundwater Conservation District</p> <p>MOB: The District will require all new exempt or non-exempt wells that are constructed within the boundaries of the District to be registered with the District in accordance with the District rules.</p> <p>PS: Issue permits within 20 days of application. Each Year the number of exempt and non-exempt wells registered by the District for the year and a list of any permits that were not issued within 20 days with the cause and corrective action taken, will be incorporated into the Annual Report submitted to the Board of Directors of the District.</p> <p>MOB: Establish a Groundwater Database for all water wells in the District. The database shall include information relating to well location, production volume, and other information deemed necessary by the District to enable effective monitoring of groundwater in Rusk County.</p> <p>PS: Document all new and existing wells by 2010. Each Year the number of new and existing groundwater wells added to the database will be presented in the Annual Report submitted to the Board of Directors of the District.</p> <p>MOB: Provide Public Education Opportunities.</p> <p>PS: Disseminate educational information regarding the hydro-geologic cycle and status of aquifers through at least two articles in Rusk County newspapers, posting on the District internet website, and as needed responses to public inquiries. The Annual Report to the Board of Directors of the District will reflect educational achievements through newspaper articles, the number of hits on the Districts web site, and the number of responses to public inquiries annually.</p>
20	<p>MOB: Each year the District will make available educational brochures to the public promoting and explaining conservation methods and concepts, on at least one occasion.</p> <p>PS: The District will make educational material available at least one time per year through service organizations, and on a continuing basis at the District Office.</p> <p>MOB: Each year, the District will provide informative speakers to school and civic groups to raise public awareness of practices that ensure the efficient use of groundwater.</p> <p>PS: Each year, the District will make at least two public speaking appearances to promote the efficient use of groundwater.</p>
21	<p>Wintergarden Groundwater Conservation District</p> <p>MOB: District will continue monitoring and recording data from the five (5) Carrizo Aquifer well/monitors.</p> <p>PS: The District will assimilate data from the aquifer water level monitors and present to the Board monthly.</p>

4.2 Controlling and Preventing Waste of Groundwater

All 21 Carrizo-Wilcox GCD's addressed the goal "*controlling and preventing waste of groundwater*" in their respective management plans. The Carrizo-Wilcox GCDs throughout the three groundwater management areas, as would be expected due to varied local conditions, have adopted different methods of addressing the management of groundwater resources in order to prevent and control the waste of groundwater. For example, Evergreen UWCD stated their management objectives was "*Each year the District will conduct an on-site investigation of any reports of waste of groundwater within two working days of the time of the receipt of the report to the District.*" and the coinciding performance standard "*A discussion on the waste of the groundwater observed by the District each year, including the number of reports of the waste of groundwater received by the District and the Districts response to the report will be included in the Annual Report on District Activities made to the Board of Directors each year.*"

The Fayette County GCD cited five objectives under "*Management Strategies to Protect and Enhance the Quantity and Quality of Useable Groundwater by Controlling and Preventing Contamination and Waste.*" The Fayette County GCD management objectives include "*Establish a Water Quality Monitoring Program*", "*Assume Proper Closing, Destruction, or Reequipping of Wells*", "*Encourage Plugging of Abandoned wells*", "*Control and Prevention of Water*", and "*Produce and Disseminate Quarterly Newsletter*".

Table 8 is a compilation of all management objectives and performance standards included in the Carrizo-Wilcox GCD management plans for controlling and preventing the waste of groundwater.

#	<p>Table 8: Controlling and Preventing Waste of Groundwater</p> <p>MOB= Management Objective PS=Performance Standard</p>
1	<p>Anderson UCWD</p> <p>MOB: Each year the District will disseminate educational information on eliminating and reducing the wasteful use of groundwater focusing on water quality protection. This may be accomplished annually by two of the following methods:</p> <ul style="list-style-type: none"> a. Conduct an annual contest on water quality protection b. Compile literature packets for distribution to schools in Anderson County c. Conduct classroom presentations d. Sponsor an educational program/curriculum e. Post information on the District's website f. Provide newspaper articles for publication g. Publish District newsletter h. Conduct public presentations i. Set up displays at public events j. Distribute brochures/literature <p>PS: The annual report will include a summary of the District activities during the year to disseminate educational information on eliminating and reducing the wasteful use of groundwater focusing on water quality protection.</p>
2	<p>Bee Groundwater Conservation District</p> <p>MOB: Measure water levels from the land surface on strategic wells on an annual basis and report waste to the District Board.</p> <p>PS: Report to the District Board annually the number of water level measurements.</p> <p>PS: The District will investigate all reports of waste of groundwater within five working days. The number of reports of waste as well as the investigation findings will be reported to the District Board in the annual report.</p>

#	Table 8: Continued
3	<p>Bluebonnet Groundwater Conservation District</p> <p>MOB: Each year, the District will make an evaluation of the District Rules to determine whether any amendments are recommended to decrease the amount of waste of groundwater within the District.</p> <p>PS: The District will include a discussion of the annual evaluation of the District Rules and the determination of whether any amendments to the rules are recommended to prevent the waste of groundwater in the Annual Report of the District provided to the Board of Directors.</p> <p>MOB: Each year, the District will provide information to the public on eliminating and reducing wasteful practices in the use of groundwater posting information or a link to information on groundwater waste reduction on the District's website.</p> <p>PS: Each year, a copy of the information provided on groundwater waste reduction on the District's website will be included in the District's Annual Report provided to the District Board of Directors.</p>
4	<p>Brazos Valley Groundwater Conservation District</p> <p>MOB: Apply a water use fee to the permitted use of groundwater in the District to encourage conservation-oriented use of the groundwater resources to eliminate or reduce waste.</p> <p>PS: Each year the District will apply a water use fee to the non-exempt permitted use of groundwater produced within the District pursuant to District rules. The amount of fees generated and the amount of water produced for each type of permitted use will be a part of the Annual Report presented to the District Board of Directors.</p> <p>MOB: Evaluate District rules annually to determine whether any amendments are necessary to decrease the amount of waste within the District.</p> <p>PS: The District will include a discussion of the annual evaluation of the District rules, and the determination of whether any amendments to the rules are necessary to prevent the waste of groundwater in the Annual Report of the District provided to the Board of Directors.</p> <p>MOB: Provide information to the public and the schools within the District on the wise use of water to eliminate and reduce wasteful practices.</p> <p>PS: The District will include a page on the Districts web-site devoted to the wise use of water and providing tips to help eliminate and reduce wasteful use of groundwater annually. The District will provide information to local school Districts including providing book covers to encourage wise use of water.</p>
5	<p>Evergreen Underground Water Conservation District</p> <p>MOB: Each year the District will conduct an on-site investigation of any reports of waste of groundwater within two working days of the time of the receipt of the report to the District.</p> <p>PS: A discussion of the waste of groundwater observed by the District each year, including the number of reports of the waste of groundwater received by the District and the District response to the report will be included in the Annual</p>

	Report on District Activities made to the Board of Directors each year.
#	Table 8: Continued
6	<p>Fayette County Groundwater Conservation District</p> <p>MOB: The District will investigate all identified wasteful practices within a reasonable number of working days of identification or complaint received, depending upon the magnitude of the wasteful practice.</p> <p>PS: Annually report to the Board of Directors on:</p> <ul style="list-style-type: none"> ◆ the number of wasteful practices identified and the average number of days District personnel took to respond or investigate after identification or complaint received. ◆ the actions taken to resolve the identification or complaint received.
7	<p>Gonzales Underground Water Conservation District</p> <p>MOB: The District will collect samples for water quality data in 20 wells annually at locations throughout the District during the same period every year and will compile 100 percent of this data into a water quality database within 30 working days of receipt. In selecting wells the District will emphasize the wells at or near the zone of bad water or potential pollution sources based on best available data.</p> <p>PS: The District will collect samples for water quality data in 20 wells annually at locations throughout the District during the same period every year and will compile 100 percent of this data into a water quality database within 30 working days of receipt. In selecting wells the District will emphasize the wells at or near the zone of bad water or potential pollution sources based on best available data.</p> <p>MOB: The District will monitor new facilities and activities on the recharge zones of the Carrizo/Wilcox, Queen City and Sparta aquifers on at least an annual basis for point source and non-point source pollution and compile 100 percent of this data into a pollution database within 30 working days from completion of the survey.</p> <p>PS: Record the date and results of visual survey of all recharge zones for point source and nonpoint source activities and facilities, the percent of available information that was entered into the database, and the number of days before the data was entered.</p> <p>MOB: The District will meet with the Railroad Commission at least once annually and coordinate its efforts with this agency in locating abandoned or deteriorated oil wells. The District will act on local complaints of abandoned or deteriorated oil wells within 30 days and compile 100 percent of the complaints and resulting District action in a database.</p> <p>PS: Record the date and number of meetings with the Railroad Commission annually.</p> <p>Record the date and number of complaints filed with the District annually, the time required to respond to each complaint, and the percentage of complaints entered into the database.</p>

#	Table 8: Continued
8	<p>Guadalupe County Groundwater Conservation District</p> <p>MOB: The District will once a year provide public information on closure of abandoned water wells and uncontrolled flowing wells through articles in local newspapers or the District's newsletter and website.</p> <p>PS: Number of times a year the District will address the proper closure of abandoned water wells and uncontrolled flowing wells in the local newspaper or the District's newsletter and website.</p>
9	<p>Live Oak Groundwater Conservation District</p> <p>MOB: NA</p> <p>PS:NA</p>
10	<p>Lost Pines Groundwater Conservation District</p> <p>MOB: To inform the residents of Bastrop and Lee counties about the waste of groundwater. Such information may be related to leaky or poorly functioning plumbing, transmission losses, xeriscaping, or any other related subject deemed appropriate by the LPGCD Board. The information on waste of groundwater may be disseminated in conjunction with information on efficient use of groundwater and/or water conservation.</p> <p>PS: At least annually, the General Manager shall cause to be published in one or more newspapers of general circulation in Bastrop and Lee counties an article on waste of groundwater. The article on waste of groundwater may be published in conjunction with an article on efficient use of groundwater and/or water conservation. In addition, to the extent practical, the LPGCD will sponsor or co-sponsor workshops open to the public that address this issue and similar issues.</p>
11	<p>McMullen Groundwater Conservation District</p> <p>MOB: Measure water levels from the land surface on strategic wells on an annual basis and report waste to the District Board.</p> <p>PS: (a) Report to the District Board annually the number of water level measurements.</p> <p>(b) The District will investigate all reports of waste of groundwater within five working days. The number of reports of waste as well as the investigation findings will be reported to the District Board in the annual report.</p>
12	<p>Medina County Groundwater Conservation District</p> <p>MOB: Each year the District will provide at least one public service announcement concerning waste, which is prohibited under the District rule, to the newspapers and to the general public on at least six occasions.</p> <p>PS:(a) The District will furnish at least six newspaper articles and/or public service announcements on an annual basis. (b) The District will investigate all written reports of waste of groundwater within 24 hours.</p>

#	Table 8: Continued
13	<p>Mid-East Texas Groundwater Conservation District</p> <p>MOB: The District will at least annually conduct at least one program to provide public information and education of the prevention of the waste of groundwater. Such programs may include newspaper publications, open meetings, handout brochures and mail-out brochures.</p> <p>PS: The District will document the number of times this activity was completed in the annual report to the Board of Directors and maintain a record of the above for subsequent audits.</p>
14	<p>Neches & Trinity Valleys Groundwater Conservation District</p> <p>MOB: 100 percent of complete permit applications will be reviewed by the District within 90 days to ensure all procedures are followed to control and prevent the waste of groundwater. The District will report annually to the Board the number of permit application requests that met the District's rules and requirements for approval within 90 days of the receipt of the completed application.</p> <p>PS: 1. Number of permits issued each year by the District for new non-exempt wells in compliance with District rules and procedures. 2. Percent of completed applications reviewed within 90 days of receipt of application.</p> <p>MOB: The District will maintain procedures for the receipt of well permit applications. Annual reports will be made to the Board on the number and type of well permits approved. If no applications are received by the District during a reporting period, this will annually be reported to the Board.</p> <p>PS: The procedures for the receipt of well permit applications will be maintained in District files. An annual report will be made by the District to the Board on the number and type of well permits approved. If no well permit applications are filed and completed during the year, this will be reported to the Board.</p>

#	Table 8: Continued.
15	<p>Panola County Groundwater Conservation District</p> <p>MOB: The District will provide information on an annual basis to the public on the elimination, reduction, and prevention of the waste of groundwater and information focused on water quality protection each year. The District will use one of the following methods to provide information to the public at least once during each fiscal year:</p> <ul style="list-style-type: none"> a. distribute literature packets or brochures within Panola County and the surrounding areas; b. provide public presentations on groundwater and water issues, including waste prevention; c. sponsor an educational program/course; d. provide information on the District's web site; e. submit newspaper articles to local paper for publication; f. present displays at local public events; or g. become involved in the distribution of information, such as brochures, in schools in Panola County. <p>PS: The District's Annual Report will include a summary of the District's efforts during the fiscal year to provide educational information to the public on the elimination, reduction and prevention of the waste of groundwater.</p> <p>MOB: The District will make an annual evaluation of its Rules to determine whether any amendments are necessary to facilitate prevention of waste of the groundwater within District boundaries.</p> <p>PS: The District's Annual Report will include a summary of the evaluation of the District Rules and will provide a recommendation as to whether any amendments to the Rules are needed to facilitate prevention of waste.</p>
16	<p>Pineywoods Groundwater Conservation District</p> <p>MOB: Determine waste as defined in the Rules of the District and the Water Code and respond to reports of waste within 4 days.</p> <p>PS: Annually review all reported sources of waste, and if corrective actions were taken when warranted. A summary that includes the number of reports of waste and the number of days the District took to respond to each report of waste will be included in the annual report to the District Board of Directors.</p>
17	<p>Plum Creek Conservation District</p> <p>MOB: The District will provide educational leadership to citizens within the District concerning this subject. The activity will be accomplished annually through at least one printed publication, such as a brochure.</p> <p>PS: A number of publications and speaking appearances by the District each year.</p>

#	Table 8: Continued
18	<p>Post Oak Savannah Groundwater Conservation District</p> <p>MOB: The District will provide educational leadership to citizens within the District concerning this subject. The activity will be accomplished annually through at least one printed publication, such as a brochure, and public speaking at service organizations and public schools as provided for in the District's Public Education Program. The District will also offer at least one grant, during years when the District's revenues remain at a level sufficient to fund the program, to sponsor the attendance of students at summer camps/seminars that place emphasis on the conservation of water resources.</p> <p>PS: The number of publications and speaking appearances by the District each year, and the number of grants offered and students actually accepting and attending an educational summer camp or seminar.</p>
19	<p>Rusk County Groundwater Conservation District</p> <p>MOB: Public Education</p> <p>PS: The District will provide educational leadership to the citizens of the District concerning this subject through at least one printed publication per year, public speaking at least once per year at service organizations or public schools, and wasteful practices posted on the Districts internet website. Each Year the number of publications and speaking appearances by the District each year will be presented in the Annual Report submitted to the Board of Directors of the District.</p> <p>MOB: Identify wasteful practices.</p> <p>PS:a) Write and adopt rules to regulate wasteful practices by December 2008. b) Track Water Quality Issues. c) Initiate a District wide program to identify the location of all abandoned wells by January 2010. d) Develop and adopt guidelines, setting forth the period of time allowed, for abandoned well owners to insure voluntary compliance with Texas Water Code well plugging requirements by January 2010.</p> <p>e) Report unplugged abandoned water wells to the well owners and Board within thirty (30) days of discovery.</p> <p>a) Hold public hearing on proposed rules to regulate wasteful practices by December 2008.</p> <p>b) Report achievements in the District's Annual Report.</p> <p>c) Provide TECQ and TWDB an annual status report on unplugged abandoned water wells beginning in 2010.</p>
20	<p>Uvalde County Underground Water Conservation District</p> <p>MOB: Each year the District will provide education materials concerning waste, which is prohibited under the District rule, to the newspapers and to the general public on at least six occasions.</p> <p>PS: (a) The District will provide to a newspaper of general circulation within the District at least six newspaper articles and/or public service announcements on an annual basis, including those that may be posted on the District's Web site.</p> <p>(b) The District will investigate all written reports of waste of groundwater within five working days from the date the report is filed with the District.</p>

#	Table 8: Continued
21	Wintergarden Groundwater Conservation District MOB: The District will at least on two (2) occasions each year provide public information on water conservation and waste prevention through public speaking appearances at public schools, and civic organizations or newspaper articles. PS: A. The number of speaking appearances made by the District each year. B. The number of newspaper articles published by the District each year.

5.3 Controlling and Preventing Subsidence

Eighteen of the 21 Carrizo-Wilcox GCDs explicitly stated in their management plans that controlling and preventing subsidence is not applicable to their districts due to the geologic and hydrogeologic profile of the region. Two other districts characterized and stated why their district was not managing subsidence within their respective GCD. Plum Creek CD stated *“Subsidence is unlikely to occur in the Plum Creek Conservation District. The District historically has not experienced any subsidence. Accordingly, the District’s Plan does not contain any “Management Objective” or related “Performance Standards” to address the issue of non-existent subsidence. Alluvium is poorly consolidated, but generally too thin to experience measurable (if any) subsidence due to groundwater withdrawals.”* Uvalde County GCD stated *“The geologic framework of the District Area precludes any significant subsidence from occurring. This management goal is not applicable to the operations of the District.”* Only the Anderson County UWCD has established a management objective and performance standard for the subsidence goal. However, the Anderson County UWCD management objective states that *“Each year, the District will manage the withdrawal of groundwater,”* and the coinciding performance standard stated *“Each year, attendance at GMA 11 meetings by a representative of the District will be reflected in the District's annual report and will*

include the number of meetings attended and the dates.”. Therefore while there is a management objective listed within this management goal, the applicability to subsidence is vague at best.

5.4 Addressing Conjunctive Surface Water Management Issues

Fourteen of the 21 Carrizo-Wilcox GCD management plans have established management objectives and performance standards to address goal four “*conjunctive surface water management issues*.” Five of the 14 Carrizo-Wilcox GCD’s state they will achieve this goal by attending meetings of regional water authority’s, such as the Brazos River Authority, Guadalupe-Blanco River Authority, and the Nueces River Authority. Further, eight of the GCD’s have elected to attend regional water planning meetings with the appropriate regional water planning group. Eight of the 21 Carrizo-Wilcox GCDs management plans reviewed stated that goal four related to conjunctive surface water management issues was not applicable to their jurisdiction: Bee GCD, Fayette County GCD, Lost Pines GCD, McMullen GCD, Mid-East Texas, Neches & Trinity Valley’s GCD, Pineywoods GCD, and Uvalde County UWCD. For instance, Bee GCD stated “*It is the opinion of the District that the Conjunctive Surface Water goal is not an issue in the District.*” Further, Uvalde County UWCD and McMullen GCD stated “*Except as provided in Chapter 36 of the Texas Water Code, the District has no jurisdiction over surface water. The District shall consider the effects of surface water resources as required by Section 36.113 and other state law.*”

Four Carrizo-Wilcox GCDs included management objectives and performance standards that went beyond meeting with regional water planning groups and river

authority's to address goal four. The degree of intergovernmental cooperation at the local and regional level varies by GCD. For example, Rusk County GCD's management objective stated *"The District will actively participate with Municipal and County Governments to encourage the development of additional surface water sources for Rusk County,"* and the coinciding performance standard stated *"Selected board members will attend at least one planning meeting per year with municipal and county government groups addressing surface water options. Each Year, the progress made by Municipal and County Governments will be submitted to the Board of Directors in the Annual Report on advancements made toward increasing surface water availability and reduction of demand on the aquifers in the county."* The second Rusk County GCD management objective for this goal stated the district would *"Coordinate conjunctive surface water issues with the East Texas Regional Water Planning Group,"* and the coinciding performance standard stated *"The District will participate in the regional planning process by attending at least 50% of the East Texas Regional Water Planning Group meetings per year. A report will be made by the board's representative at each board meeting of the Rusk County Groundwater Conservation District, updating the Board on conjunctive surface water issues being discussed by the ETRWPG."*

The management objectives and performance standards set forth by certain Carrizo-Wilcox GCDs may also be representative of a particular districts definition of conjunctive use. According to the Texas Administrative Code §356.2(a)(7) conjunctive use issues are *"Issues relating to the combined use of groundwater and surface water sources that optimize the beneficial characteristics of each source."* For example, the

Evergreen UWCD management objective for this goal stated that *“Each year the District will use the Southern Carrizo-Wilcox Groundwater Availability Model to predict the potential effects of different groundwater pumping scenarios on both groundwater and surface water. In addition, each year the District will arrange to meet with the appropriate surface water management entities”* and the coinciding performance standard stated *“A summary of the discussion(s) with the surface water management entities for status on surface water conditions will be relayed in a memorandum to the Board of Directors each year.”*

The Live Oak UWCD management plan listed the following management objectives that support developing a more comprehensive understanding of how local groundwater and surface water resources interact via well and stream monitoring programs.

1. Attend meeting with surface water entities in the district, to include but not limited to; conjunctive use, emergency response, and drought contingency planning
2. Evaluate existing historical data and data derived from new monitoring programs to enhance understanding of aquifer/surface-water relationships
3. Evaluate impact of surface-water usage on groundwater resources within the District as needed. Provide comments regarding surface-water rights requests for those requests effecting the groundwater resources of the district
4. Coordinate with other entities on regional planning efforts

One performance standard was included for the four management objectives listed above, *“District representative will attend 1 meeting with surface water entities annually. District representative will attend 1 meeting concerning regional water planning annually. Coordinate with other entities on regional planning efforts.”*

Intergovernmental cooperation appears to be an important element of this plan for the management of local and trans-boundary water resources.

The Medina County GCD management objectives stated *“The District will attend 50% of the regular meetings of the Region L Regional Water Planning Group and coordinate activities when requested by surface water management entities within the District”* and the coinciding performance standard states *“The District will attend at least 50% of the regular meetings of the Region L Regional Water Planning Group and coordinate activities when requested by surface water management entities within the District. The District will report these activities annual in the District annual report to the Board of Directors.”*

Table 9 is a compilation of all management objectives and performance standards included in the Carrizo-Wilcox GCD management plans addressing conjunctive surface water management issues.

Table 9: Addressing Conjunctive Surface Water Management Issues	
#	MOB: Management Objective PS: Performance Standard
1	Anderson UWCD PS: Each year, the District will participate in the regional planning process by attending at least one meeting of the regional water-planning group per fiscal year. MOB: Each year, attendance at Region I meetings by a representative of the District will be reflected in the District's annual report and will include the number of meetings attended and the dates.
2	Bluebonnet Groundwater Conservation District PS: Each year, the District will participate in the regional planning process by being represented at the Region G and Region H Regional Water Planning Group meetings. MOB: The attendance of a District representative to at least 50 percent of the Region G and Region H Regional Water Planning Group meetings will be noted in the Annual Report presented to the District Board of Directors.

#	Table 9: Continued
3	<p>Brazos County GCD:</p> <p>MOB: Encourage the use of surface water supplies where available, to meet the needs of specific user groups within the District.</p> <p>PS: The District will participate in the Region G - Regional Water Planning process by attending at least one RWPG meeting annually and will encourage the development of surface water supplies where appropriate. This activity will be noted in the Annual Report presented to the District Board of Directors.</p>
4	<p>Evergreen UWCD</p> <p>MOB: Each year the District will use the Southern Carrizo-Wilcox Groundwater Availability Model to predict the potential effects of different groundwater pumping scenarios on both groundwater and surface water. In addition, each year the District will arrange to meet with the appropriate surface water management entities.</p> <p>PS: A summary of the discussion(s) with the surface water management entities for status on surface water conditions will be relayed in a memorandum to the Board of Directors each year.</p>
5	<p>Gonzales County UWCD</p> <p>MOB: The District will meet with the staff of the Guadalupe Blanco River Authority, at least once a year, to share information updates about conjunctive use potential.</p> <p>PS: Record the date and number of meetings with GBRA representatives annually.</p>
6	<p>Guadalupe GCD</p> <p>MOB: Each year the District will confer at least on one occasion with the Guadalupe-Blanco River Authority (GBRA) on cooperative opportunities for conjunctive resource management.</p> <p>PS: Number of meetings per year with GBRA on conjunctive resource management. A memo to document the meeting will be on file in the District's office.</p>
7	<p>Live Oak UWCD</p> <p>MOB: 1) Attend meeting with surface water entities in the district, to include but not limited to; conjunctive use, emergency response, drought contingency planning 2) Evaluate existing historical data and data derived from new monitoring programs to enhance understanding of aquifer/surface-water relationships 3) Evaluate the impact of surface-water usage on groundwater resources within the District as needed. Provide comments regarding surface-water rights requests for those requests affecting the groundwater resources of the district. Coordinate with other entities on regional planning efforts.</p> <p>PS: District representative will attend 1 meeting with surface water entities annually. District representative will attend 1 meeting concerning regional water planning annually.</p>

#	Table 9: Continued
8	<p>Medina County GCD</p> <p>MOB: The District will attend 50% Of the regular meetings of the Region L Regional Water Planning Group and coordinate activities when requested by surface water management entities within the District.</p> <p>PS: The District will attend at least 50% of the regular meetings of the Region L Regional Water Planning Group and coordinate activities when requested by surface water management entities within the District. The District will report these activities annual in the District annual report to the Board of Directors.</p> <p>a. Attend meeting with surface water entities in the district, to include but not limited to; conjunctive use, emergency response, drought contingency planning</p> <p>b. Evaluate existing historical data and data derived from new monitoring programs to enhance understanding of aquifer/surface-water relationships</p> <p>c. Evaluate the impact of surface-water usage on groundwater resources within the District as needed. Provide comments regarding surface-water rights requests for those requests effecting the groundwater resources of the district</p> <p>Coordinate with other entities on regional planning efforts.</p>
9	<p>Panola County GCD</p> <p>MOB: The attendance at any Region I meeting by a representative of the District will be included in the District's Annual Report and will indicate the dates of attendance.</p> <p>PS: The District will participate in the regional planning process by sending a representative to attend at least one meeting of the East Texas Regional Water Planning Group (Region I) each fiscal year.</p>
10	<p>Plum Creek GCD</p> <p>MOB: Each year the District will confer at least once with the Guadalupe-Blanco River Authority (GBRA) and other local political subdivisions and water and wastewater utilities on cooperative opportunities for conjunctive resource management.</p> <p>PS: The number of conferences with the GBRA, other political subdivisions and water and wastewater utilities, on conjunctive resource management each year. The District will continue to monitor progress of the Plum Creek Watershed Project.</p>
11	<p>Post Oak Savannah GCD</p> <p>MOB: Each year the District will confer at least once with the Brazos River Authority (BRA) on cooperative opportunities for conjunctive resource management.</p> <p>PS: The number of conferences with the BRA on conjunctive resource management each year.</p>

#	Table 9: Continued
12	<p>Rusk County GCD</p> <p>MOB: The District will actively participate with Municipal and County Governments to encourage the development of additional surface water sources for Rusk County.</p> <p>PS: Selected board members will attend at least one planning meeting per year with municipal and county government groups addressing surface water options. Each Year, the progress made by Municipal and County Governments will be submitted to the Board of Directors in the Annual Report on advancements made toward increasing surface water availability and reduction of demand on the aquifers in the county.</p> <p>MOB: Coordinate conjunctive surface water issues with the East Texas Regional Water Planning Group.</p> <p>PS: The District will participate in the regional planning process by attending at least 50% of the East Texas Regional Water Planning Group meetings per year. A report will be made by the board's representative at each board meeting of the Rusk County Groundwater Conservation District, updating the Board on conjunctive surface water issues being discussed by the ETRWPG.</p>
13	<p>Wintergarden GCD</p> <p>MOB: Each year the District will confer at least on one occasion with the Nueces River Authority on cooperative opportunities for conjunctive resource management.</p> <p>PS: The number of conferences on conjunctive resource management opportunities held with Nueces River Authority each year.</p>

In summary, participation in governing local groundwater and surface water resources is varied. Groundwater resources and surface water resources interaction differs regionally because of different hydrological and hydrogeological interactions in the environment. From this review, it is apparent that regional water planning groups and river authorities are the focal point for the coordination of groundwater and surface water issues for Carrizo-Wilcox GCDs

5.5 Addressing Natural Resources Issues

Fourteen of 21 Carrizo Wilcox GCDs included management objectives and performance standards for goal five, “*addressing natural resource issues.*” Seven districts elected not to include any management objectives or performance standards addressing natural resource issues. For example, Mid-East Texas GCD stated “*There are no known natural resource issues in the District that have an impact on the groundwater quantity or quality at this time. Therefore, this goal is not applicable to the District at this time,*” Similarly, Rusk County GCD stated “*The District has no documented occurrences of endangered or threatened species dependent upon groundwater resources. However, the District will coordinate with the Texas Commission on Environmental Quality (TCEQ) on water quality issues.*”

Gonzales UWCD, Post Oak Savannah GCD, and Plum Creek CD made reference to communicating with the Railroad Commission of Texas in their management objectives and performance standards under the natural resources goal of their management plans.

Natural resource issues that could be monitored cooperatively by Carrizo-Wilcox GCDs and the Railroad Commission of Texas including the regulation and plugging of abandoned oil and gas wells, well construction of oil and gas production wells and related Class 2 disposal wells, and the documentation and monitoring of active pipelines, inactive pipelines, and other pipelines that may pose a threat to the quality of Carrizo-Wilcox Aquifer groundwater resources were not addressed as frequently as possible in the management plans reviewed for the study.

One example of cooperation is the following Gonzales UWCD management objective that states “*The District will meet with the local Railroad Commission of Texas engineering technician at least once annually to review oil well permits and oil related activity that could endanger the aquifers.*” Another example is the Plum Creek CD management objective that states “*Each year the District will confer at least once with a representative of the Railroad Commission of Texas (RCT) on the impact of oil and gas production or waste and disposal operations associated with oil and gas production on groundwater availability and quality, as well as the impact of groundwater production on the production of oil and gas in the District. 2. Also, during each year the District will evaluate all permit applications for new production injection or disposal wells permitted by the Railroad Commission, if any are filed, and the information submitted by the applicants on those wells prior to drilling, in order to assess the impact of these wells on the groundwater resources in the District.*”

A Post Oak Savannah GCD management objective states “*Each year the District will confer at least once with a representative of the Railroad Commission of Texas (RCT) on the impact of oil and gas production on groundwater availability, as well as the impact of groundwater production on the production of oil and gas in the District.*”

However, the 18 other Carrizo-Wilcox GCDs elected not to address the contamination monitoring through cooperation with the TRRC on oil and gas activity within their respective jurisdictions under goal five “*addressing natural resource issues*”.

Other opportunities for addressing natural resource issues that were not included in the management plans reviewed include: (1) monitoring of point source or non-point

source pollution that may be of concern for natural resources within their jurisdiction, (2) natural sources of groundwater contamination, and (3) opportunities such as partnering with the TCEQ's Groundwater Planning and Assessment Team which provides "support and coordination of interagency efforts toward preventing and managing contamination of groundwater by pesticides," or the Texas Groundwater Protection Committee.

According to the August 2010 Texas Groundwater Protection Committee's *Joint Groundwater Monitoring and Contamination Report-2009* the "(Texas)RCT has jurisdiction over discharges or spills associated with the transportation of crude oil prior to refining of the oil, and of natural gas prior to its use in a manufacturing process or as a residential or industrial fuel. As a result, discharges or spills from crude oil or natural gas pipelines are under the jurisdiction of the RCT. However, discharges or spills from pipelines transporting refined products such as gasoline, diesel, or other fuel oils fall under the regulatory jurisdiction of the TCEQ, and the Spill Prevention and Control Rules should be followed. As specified under the State of Texas Oil and Hazardous Substances Spill Contingency Plan, the TCEQ serves as the lead agency in directing and approving the response for the discharge or spill of a harmful quantity of crude oil (defined as five or more barrels discharged or spilled on the ground or any quantity discharged or spilled into water) during highway or rail transportation" (Texas Groundwater Protection Committee, 2010).

Texas Water Code §5.236 requires the TCEQ to provide notice to local officials regarding groundwater contamination which may affect drinking water supplies in their area. Notification is provided to county judges and public health officials to supply

information on groundwater impacts to drinking water supplies within the county. However, the Carrizo-Wilcox GCDs did not include management objectives or performance standards recognizing or utilizing this source of information from state agencies and committees regarding groundwater contamination.

Eighty percent of the management objectives and performance standards focused on water quantity concerns and not water quality concerns. In many instances well depth and well technology protect Carrizo-Wilcox Aquifer water quality from contamination. The possibility for contamination is always present; however, and the groundwater resource should be protected accordingly. For example, Evergreen UWCD management objective stated *“Each year the District will sample at least 40 water wells in the District for chemical analysis of water quality”* and the coinciding performance standard stated *“A table giving the results of the chemical analyses of the water quality samples taken by the District each year will be included in the Annual Report on District Activities made to the Board of Directors. A discussion of whether any instances of groundwater contamination or issues of concern were noted in the water quality sample analyses will be included in the Annual Report on District Activities made to the Board of Directors.”* Information gathered by the Evergreen GCD will be helpful for interagency cooperation to evaluate and possibly eliminate or regulate anthropogenic pollution factors within the District.

A few Carrizo-Wilcox GCDs adopted management objectives and performance standards that comprehensively address natural resource issues within their jurisdictions on an annual basis. For example, the Lost Pines GCD management objective stating *“To*

provide information to the public about the status of groundwater use, availability, and water levels and a description of natural resource issues, e.g., mining, out of District transport of groundwater, protection of endangered species, or the spread of phreatophytic vegetation, that impact the use and availability of groundwater or which are affected by the use and availability of groundwater,” and the coinciding management objective stated “At least annually, the General Manager shall prepare a report for the LPGCD board on the status of groundwater use, availability, and water levels within the District and a description of natural resource issues. Once this report is reviewed and accepted by the LPGCD Board, it shall be made available to the public at the District’s office. In addition, the General Manager will cause a summary of the annual report to be published in one or more newspapers of general circulation in Bastrop and Lee counties. To the extent practical, the LPGCD also will sponsor or co-sponsor workshops open to the public that address this issue and similar issues.”

Table 10 is a compilation of all management objectives and performance standards included in the Carrizo-Wilcox GCD management plans addressing natural resource issues.

	Table 10: Addressing Natural Resource Issues
#	MOB= Management Objective PS=Performance Standard
1	<p>Anderson Underground Water Conservation District</p> <p>MOB: Each year, the District will require permits for all non-exempt use of groundwater in the District as defined in the District rules, in accordance with adopted procedures.</p> <p>PS: Each year, a summary of the number of applications for the drilling of non-exempt wells, the number of applications for the permitted use of groundwater and the disposition of the applications will be presented in the District's annual report.</p>
2	<p>Bluebonnet Groundwater Conservation District</p> <p>Bee Groundwater Conservation District</p> <p>MOB: The District will cooperate with other interested parties and appropriate agencies to develop additional information on aquifer recharge.</p> <p>PS: A representative of the District will attend a meeting annually with interested parties and appropriate agencies.</p>
3	<p>Brazos Valley Groundwater Conservation District</p> <p>MOB: Determine if there are any natural spring flows within the District that may be impacted by increased groundwater pumping.</p> <p>PS: Annually monitor water levels in at least 2 wells near natural spring flows, if found, for potential impact from groundwater production. Prepare an annual assessment statement and include in annual report to the District Board of Directors.</p>
4	<p>Evergreen Underground Water Conservation District</p> <p>MOB: Each year the District will sample at least 40 water wells in the District for chemical analysis of water quality.</p> <p>PS: A table giving the results of the chemical analyses of the water quality samples taken by the District each year will be included in the Annual Report on District Activities made to the Board of Directors. A discussion of whether any instances of groundwater contamination or issues of concern were noted in the water quality sample analyses will be included in the Annual Report on District Activities made to the Board of Directors.</p>

#	Table 10: Continued
5	<p>Gonzales Underground Water Conservation District</p> <p>MOB: The District will meet with Natural Resources Conservation Service representatives to exchange information on wells and water levels at least once annually.</p> <p>PS: Record the date and number of meetings with the Natural Resource Conservation Service representatives annually.</p> <p>MOB: The District will meet with the local Railroad Commission of Texas engineering technician at least once annually to review oil well permits and oil related activity that could endanger the aquifers.</p> <p>PS: Record the date and number of meetings with the Railroad Commission engineering technician annually</p>
6	<p>Guadalupe County Groundwater Conservation District</p> <p>MOB: Each year the District will evaluate all proposed new wells prior to drilling. Information submitted by the applicant will be evaluated in order assess water level impacts within the District.</p> <p>PS: A monthly report to the Board will be made on the results of all water level impact studies and number of wells evaluated each month.</p>
7	<p>Lost Pines Groundwater Conservation District</p> <p>MOB: To provide information to the public about the status of groundwater use, availability, and water levels and a description of natural resource issues, e.g., mining, out of District transport of groundwater, protection of endangered species, or the spread of phreatophytic vegetation, that impact the use and availability of groundwater or which are affected by the use and availability of groundwater.</p> <p>PS: At least annually, the General Manager shall prepare a report for the LPGCD board on the status of groundwater use, availability, and water levels within the District and a description of natural resource issues. Once this report is reviewed and accepted by the LPGCD Board, it shall be made available to the public at the District's office. In addition, the General Manager will cause a summary of the annual report to be published in one or more newspapers of general circulation in Bastrop and Lee counties. To the extent practical, the LPGCD also will sponsor or co-sponsor workshops open to the public that address this issue and similar issues.</p>
8	<p>McMullen Groundwater Conservation District</p> <p>MOB: The District will cooperate with other interested parties and appropriate agencies to develop additional information on aquifer recharge.</p> <p>PS: A representative of the District will attend a meeting annually with interested parties and appropriate agencies.</p>

#	Table 10: Continued
9	<p>Medina County Groundwater Conservation District</p> <p>MOB: Each year the District will work with various interest groups and appropriate agencies, such as the San Antonio River Authority, to provide information on aquifer storage and recovery projects and will require permits for all aquifer storage and recovery projects.</p> <p>PS: The District will require permits for all aquifer and storage projects within the District and report the number of applications submitted annually. The District will provide one article to a newspaper of general circulation in the District regarding the San Antonio River Authority's Aquifer Storage and Recovery project.</p>
10	<p>Panola County Groundwater Conservation District</p> <p>MOB: The District will monitor water-levels within District boundaries on an annual basis by measuring the water level of at least 5 wells.</p> <p>PS: The District's Annual Report will include a description of the number of wells measured and the monitoring results of the measured well for each year.</p>
11	<p>Plum Creek Conservation District</p> <p>MOB: 1. Each year the District will confer at least once with a representative of the Railroad Commission of Texas (RCT) on the impact of oil and gas production or waste and disposal operations associated with oil and gas production on groundwater availability and quality, as well as the impact of groundwater production on the production of oil and gas in the District.</p> <p>2. Also, during each year the District will evaluate all permit applications for new production injection or disposal wells permitted by the Railroad Commission, if any are filed, and the information submitted by the applicants on those wells prior to drilling, in order to assess the impact of these wells on the groundwater resources in the District.</p> <p>PS: 1. The number of conferences with a representative of the Texas RCT each year;</p> <p>2. The addition of available RCT well data to the District's database;</p> <p>3. Monthly reports to the PCCD Board of Directors on the number of new well permit applications filed, and the possible impacts of those new wells on the groundwater resources in the District; and</p> <p>4. Annual reports to the Board about consumption and use of groundwater for commercial purposes, including irrigation uses and enhanced oil and gas production when information is available.</p>

#	Table 10: Continued.
12	<p>Post Oak Savannah Groundwater Conservation District</p> <p>MOB: Each year the District will confer at least once with a representative of the Railroad Commission of Texas (RCT) on the impact of oil and gas production on groundwater availability, as well as the impact of groundwater production on the production of oil and gas in the District.</p> <p>PS: The number of conferences with a representative of the Texas RCT each year.</p> <p>MOB: Also, during each year the District will evaluate all permit applications for new wells, if any are filed, and the information submitted by the applicants on those wells prior to drilling, in order to assess the impact of these wells on the groundwater resources in the District.</p> <p>PS: Monthly reports to the POSGCD Board of Directors on the number of new well permit applications filed, and the possible impacts of those new wells on the groundwater resources in the District.</p>
13	<p>Uvalde County Groundwater Conservation District</p> <p>MOB: Each year the District will cooperate with interested parties and appropriate agencies to develop additional information on aquifer recharge and weather modification projects.</p> <p>PS:(a) The District will establish terms for all aquifer recharge, transportation, or storage project permits. The District shall take into consideration all applicable factors and requirements of the District's rules and state law.</p> <p>(b) The District will make all information available to the District on such projects available to the general public and to permit applicants annually.</p> <p>(c) The District shall require owners or operators of all aquifer pumping, recharge, transportation, or storage projects affecting the district to obtain a permit amendment if the use, volume of groundwater pumped, location of, or means of transportation, recharge, or storage changes from the manner in which it was originally permitted.</p> <p>MOB: The District will require issuance of a well construction permit, or preregistration of exempt wells not requiring a construction permit, prior to the drilling of all new wells for all aquifers under the District's jurisdiction.</p> <p>PS: All well construction permits in compliance with the District rules will be issued within 20 days. Well construction permits not in compliance with the rules, as determined by the General Manager, will be considered at the next regular board meeting, but within 90 days of the General Manager's determination of the application's compliance with District rules.</p>

#	Table 10: Continued.
14	Wintergarden Groundwater Conservation District MOB: Each year the District will insure that all new wells permitted for construction within the District, comply with the District construction standards through monitoring of the State of Texas water well report required to be provided to the District by water well drillers. PS: The number of newly permitted water wells within the District monitored for compliance will be reported to the Board annually.

5.6 Addressing Drought Conditions

All Carrizo-Wilcox GCDs included management objectives and performance standards for goal six, “*Addressing Drought Conditions*”. Each GCD elected to address drought conditions through establishing a Drought Contingency Plan, monitoring the Palmer Drought Severity Index, or to maintain updates with the Drought Preparedness Council Situation Report. Districts have created rules that trigger conservation by water users in their jurisdictions. Largely, Carrizo-Wilcox GCD boards of directors and general managers are responsible for implementing plans and notifying residents of the water conservation measures established by the individual districts. Thirteen out of 21 Carrizo-Wilcox GCDs stated that they would monitor the Palmer Drought Severity Index; however, several districts did not include detailed management objectives and performance standards necessary to determine whether or not the goal is being achieved.

For instance, Anderson County UWCD District management objective stated “*Each month, the District will download the updated Palmer Drought Severity Index (PDSI) map and check for the periodic updates to the Drought Preparedness Council Situation Report posted on the Texas Water*” and the coinciding performance standard stated “*Each year, the downloaded PDSI maps and Situation Reports will be included in the District Annual Report to the Board of Directors*”. Brazos Valley GCD went beyond

monitoring the Palmer Drought Severity Index (PDSI) and stated that the District would *“Require 100 percent of water producers that are required by the state of Texas to have drought contingency plans, to submit those plans to the District when applying for a permit for well production from the District.”* Further, the coinciding performance standard stated *“Review 100 percent of the drought contingency plans submitted as a result of permit requirements whenever a severe drought condition is reached as determined by the PDSI. The number of drought contingency plans required to be submitted by water producers to the District as part of the well permitting process and the number of drought contingency plans actually submitted to the District will be reports in the annual report to the District Board of Directors.”* Though methodologies vary, districts have committed to monitoring drought conditions and report the findings at least annually to the public. One observation is that more timely dissemination of current drought information to district residents would be a beneficial service for the districts to provide.

Precipitation and climate vary from east to west in the state as do the hydrologic and hydrogeological characteristics. Generally prolonged droughts in Texas are perceived as a threat to the environment, human welfare, and to the economy of the state. According to our evaluation, six of the Carrizo-Wilcox GCD’s called for development of Drought Contingency Plans or Drought Management Strategy Plans when “addressing drought conditions”, including Brazos Valley GCD, Neches & Trinity Valleys GCD, Pineywoods GCD, Plum Creek CD, Post Oak Savannah GCD and Rusk County GCD. Drought Contingency Plans are designed to be the preferred course of action to fulfill the

need of each district. For instance, the Guadalupe County GCD established a “*Drought Management Plan to cope with the effects of water supply deficits due to climatic or other conditions will be adopted by the Board after notice and hearing. In developing the contingency plan, the District will consider the economic effect of conservation measures upon all water resource user groups, the local implications of the degree and effect of changes in water storage conditions, the unique hydrogeologic conditions of the aquifers within the District and the appropriate conditions under which to implement the contingency plan.*” Therefore, after a thorough review of the District management plans it appears that more may have to be done at the local level of government to ensure that strategic groundwater resources important to the environment and economy are more adequately monitored during drought conditions. For example, Fayette County GCD management objective stated “*The annual amount of groundwater permitted by the District for withdrawal from the portion of the aquifers located within the District may be curtailed during periods of extreme drought in the recharge zones of the aquifers or because of other conditions that cause significant declines in groundwater surface elevations. Such curtailment may be triggered by the District’s Board based on the groundwater elevation measured in the District’s monitoring well(s)*” and the coinciding performance standard stated “*The District shall monitor at least one well each year. Annually report to the Board of Directors the number of measurements obtained from the water level monitoring network. A summary report of the water level measurement results and an analysis of any situations that may require curtailment of groundwater withdrawal will be included in the report.*”

Another observation is that certain Carrizo-Wilcox GCD management plans could benefit from the utilization of more than just one well as a drought monitor well, considering that some districts have expansive jurisdictions. Further, districts including Gonzales Underground Water Conservation District state that *“The General Manager will access the National Weather Service–Climate Prediction Center website*

(http://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml)

monthly to determine the Palmer Drought Severity Index and will submit a report to the Board of Directors monthly. The District will, 100 percent of the time when under extreme drought conditions, as defined by the Palmer Drought Severity Index, provide information to and coordinate with local water users and water managers regarding drought response activities.” Lost Pines GCD management objective stated that *“Drought conditions are to be addressed on an ongoing basis by tracking rainfall records available from nearby weather stations as compared to hydrographs for LPGCD monitoring wells. At least once per month, the General Manager will update rainfall and water level records maintained by the LPGCD. Based on GAM modeling and an understanding of the outcrop areas of the principal aquifers – Simsboro, Carrizo, Queen City, and Sparta – in the LPGCD, recharge appears to be relatively constant under the current climatic regime and little affected by drought conditions. It is anticipated, though that drought conditions will result in increased pumpage and decreased natural discharge, thereby affecting water levels in the aquifers.”* Lost Pines GCD’s performance standard is a positive example of the amount of transparency and reporting of drought conditions to the public. The District’s performance standard stated *“At least*

annually, the General Manager shall prepare a report for the LPGCD board on precipitation amounts as compared to water levels within the District and a description of apparent trends. Once this report is reviewed and accepted by the LPGCD Board, it shall be made available to the public at the District's office. In addition, the General Manager will cause a summary of the annual report to be published in one or more newspapers of general circulation in Bastrop and Lee counties. The summary may be published in conjunction with the publication of the summary of natural resource issues. In addition, to the extent practical, the LPGCD will sponsor or co-sponsor workshops open to the public that address this issue and similar issues." Public information and awareness of drought conditions is an important step to managing groundwater resources in times of need.

Carrizo-Wilcox GCDs are addressing drought conditions by varied means. From Live Oak GCD's participation in the South Texas Weather Modification Program and attendance of South Texas Weather Modification Association meetings to Neches & Trinity Valleys GCD's multi-pronged approach to addressing drought conditions. Simply stated, drought conditions impact groundwater resources differently from region to region and this is recognized from this review.

	Table 11: Addressing Drought Conditions
#	MOB=Management Objective PS=Performance Standard
1	<p>Anderson County Groundwater Conservation District</p> <p>MOB: Each month, the District will download the updated Palmer Drought Severity Index (PDSI) map and check for the periodic updates to the Drought Preparedness Council Situation Report posted on the Texas Water.</p> <p>PS: Each year, the downloaded PDSI maps and Situation Reports will be included in the District Annual Report to the Board of Directors.</p>
2	<p>Bluebonnet Groundwater Conservation District</p> <p>MOB: Each month, the District will download available drought information, for the counties in the District, from available websites on the internet.</p> <p>PS: Quarterly, the District will make an assessment of the status of drought in the District and prepare a quarterly briefing for the Board of Directors. The downloaded maps, reports and information will be included with copies of the quarterly briefings, in the District Annual Report to the Board of Directors.</p>
3	<p>Bee Groundwater Conservation District</p> <p>MOB: The District will monitor the Palmer Drought Severity Index (PDSI).</p> <p>PS: A report of the Palmer Drought Severity Index will be presented to the District board on an annual basis.</p>
4	<p>Brazos Valley Groundwater Conservation District</p> <p>MOB: A report of the Palmer Drought Severity Index will be presented to the District board on an annual basis.</p> <p>PS: The District will make an assessment of drought conditions in the District and will prepare an annual briefing to the Board of Directors.</p> <p>MOB: Require 100 percent of water producers that are required by the state of Texas to have drought contingency plans, to submit those plans to the District when applying for a permit for well production from the District.</p> <p>PS: Review 100 percent of the drought contingency plans submitted as a result of permit requirements whenever a severe drought condition is reached as determined by the PDSI. The number of drought contingency plans required to be submitted by water producers to the District as part of the well permitting process and the number of drought contingency plans actually submitted to the District will be reports in the annual report to the District Board of Directors.</p> <p>MOB: Develop a District drought contingency plan. The target goal for developing the plan is June 2010. The drought contingency plan will be reviewed for effectiveness and needed updates once annually.</p> <p>PS: A report summarizing the findings of the annual review of the District drought contingency plan will be included in the annual report of the District Board of Directors.</p>

#	Table 11: Continued
5	<p>Evergreen Groundwater Conservation District</p> <p>MOB: Each month, the District will download at least one updated Palmer Drought Severity Index (PDSI) map posted on the National Weather Service - Climate Prediction Center website (http://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml) and check for the periodic updates to the Drought Preparedness Council Situation Report (Situation Report) posted on the Texas Department of Public Safety website (http://www.txdps.state.tx.us/dem/sitrepindex.html).</p> <p>PS: Quarterly, the District will make an assessment of the status of drought in the District and prepare a quarterly briefing to the Board of Directors. The downloaded PDSI maps and Situation Reports will be included with copies of the quarterly briefing in the District Annual Report to the Board of Directors.</p>
6	<p>Fayette Groundwater Conservation District</p> <p>MOB: <i>Curtailment of Groundwater Withdrawal:</i> The annual amount of groundwater permitted by the District for withdrawal from the portion of the aquifers located within the District may be curtailed during periods of extreme drought in the recharge zones of the aquifers or because of other conditions that cause significant declines in groundwater surface elevations. Such curtailment may be triggered by the District's Board based on the groundwater elevation measured in the District's monitoring well(s).</p> <p>PS: The District shall monitor at least one well each year. Annually report to the Board of Directors the number of measurements obtained from the water level monitoring network. A summary report of the water level measurement results and an analysis of any situations that may require curtailment of groundwater withdrawal will be included in the report.</p>

#	Table 11: Continued
7	<p>Gonzales Underground Water Conservation District</p> <p>MOB: The General Manager will access the National Weather Service –Climate Prediction Center website monthly to determine the Palmer Drought Severity Index and will submit a report to the Board of Directors monthly. http://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml</p> <p>The District will, 100 percent of the time when under extreme drought conditions, as defined by the Palmer Drought Severity Index, provide information to and coordinate with local water users and water managers regarding drought response activities.</p> <p>PS: Record the date and number of monthly reports made to the District Board of Directors. Record the date and number of times when the District was under extreme drought conditions and the number of times letters were sent to public water suppliers.</p>
8	<p>Guadalupe County Groundwater Conservation District</p> <p>MOB: The District developed and adopted a Drought Management Plan in 2007. The District will obtain the Palmers Drought Severity Index (PDSI), as per the District's Drought Management Plan.</p> <p>PS: Number of reports made to the board each year on the PDSI.</p>
9	<p>Live Oak Groundwater Conservation District</p> <p>MOB: 1) Participate in the South Texas Weather Modification Program. 2) Evaluate the performance of the weather modification program.</p> <p>PS: District representative will attend 1 meeting of the South Texas Weather Modification Assn. Annually.</p>
10	<p>Lost Pines Groundwater Conservation District</p> <p>MOB: Drought conditions are to be addressed on an ongoing basis by tracking rainfall records available from nearby weather stations as compared to hydrographs for LPGCD monitoring wells. At least once per month, the General Manager will update rainfall and water level records maintained by the LPGCD. Based on GAM modeling and an understanding of the outcrop areas of the principal aquifers – Simsboro, Carrizo, Queen City, and Sparta – in the LPGCD, recharge appears to be relatively constant under the current climatic regime and little affected by drought conditions. It is anticipated, though that drought conditions will result in increased pumpage and decreased natural discharge, thereby affecting water levels in the aquifers.</p> <p>PS: At least annually, the General Manager shall prepare a report for the LPGCD board on precipitation amounts as compared to water levels within the District and a description of apparent trends. Once this report is reviewed and accepted by the LPGCD Board, it shall be made available to the public at the District's office. In addition, the General Manager will cause a summary of the annual report to be published in one or more newspapers of general circulation in Bastrop and Lee counties. The summary may be published in conjunction with the publication of the summary of natural resource issues. In addition, to the extent practical, the LPGCD will sponsor or co-sponsor workshops open to the public that address this issue and similar issues.</p>

#	Table 11: Continued
11	<p>McMullen Groundwater Conservation District</p> <p>MOB: The District will monitor the Palmer Drought Severity Index (PDSI).</p> <p>PS: A report of the Palmer Drought Severity Index will be presented to the District board on an annual basis.</p>
12	<p>Medina County Groundwater Conservation District</p> <p>MOB: Each month, the District will download the updated Palmer Drought Severity Index (PDSI) map and check for the periodic updates to the Drought Preparedness Council Situation Report (Situation Report) posted on the Texas Water Information Network Web site www.txwin.net.</p> <p>PS: Quarterly, the District will make an assessment of the status of drought in the District and prepare a quarterly briefing to the Board of Directors. The downloaded PDSI maps and Situation Reports will be included with copies of the quarterly briefing in the District Annual Report to the Board of Directors.</p>
13	<p>Mid-East Groundwater Conservation District</p> <p>MOB: The District shall call for the most efficient use of groundwater by all users in the District to maintain sufficient groundwater aquifer resources during periods of drought and for future resources by preventing waste and by regulation of users, if necessary to prevent depletion of the aquifers. The District will review the Texas Palmer Drought Index and the Texas Drought Preparedness Report, and monitor the District's production figures annually.</p> <p>PS: The District will document the number of times this activity was completed in the annual report to the Board of Directors and maintain a record of the above for subsequent audits.</p>
14	<p>Neches & Trinity Valleys Groundwater Conservation District</p> <p>MOB: The Board has adopted a contingency plan to cope with the effects of water supply shortages due to climatic or other conditions. The plan is reviewed at least annually by the Board. In developing the contingency plan, the District considered the economic effects of conservation measures upon all water resource user groups, the local implications of the degree and effect of changes in water storage conditions, the unique hydro-geologic conditions of the aquifer and the appropriate conditions under which to implement the contingency plan. During extreme drought conditions within the District as measured by the Palmer Drought Index, all efforts will be made to see that all municipalities and public water supply companies follow their drought contingency plans. During extreme drought conditions that materially affects the aquifer levels, the District staff will closely monitor the aquifer levels through establishment of a District monitoring plan of static levels in selected monitoring wells or by obtaining well water levels from selected water supply companies who have such data available to ensure that adequate quantities of water are available to the District and will coordinate with the Region C and I Water Planning Groups.</p> <p>PS: A drought contingency plan developed by the District and approved by the Board will be reviewed by the Board every year and revised as necessary. During extreme drought conditions within the District, efforts will be made through contact by District staff to see that municipalities and public water supply companies follow their drought contingency plans.</p>

#	Table 11: Continued
15	<p>Panola County Groundwater Conservation District</p> <p>MOB: The District will download at least one updated Palmer Drought Severity Index ("PDSI") map each month and will check for the regular updates to the Drought Preparedness Council Situation Report ("Situation Report") posted on the following website: http://www.txdps.state.tx.us/dem/sitrepindex.html.</p> <p>PS: The District will include the 12 monthly downloaded PDSI maps and Situation Reports in the Annual Report for each fiscal year.</p>
16	<p>Pineywoods Groundwater Conservation District</p> <p>MOB: The District shall call for the most efficient use of groundwater by all users in the District to maintain sufficient groundwater aquifer resources during periods of drought and for future resources by preventing waste and by regulation of users, if necessary, to prevent depletion of the aquifers. To work closely with groundwater users and provide assistance where it is possible to control customer usage as it is outlined in their Drought Contingency Plans.</p> <p>PS: Periodically review the Texas Palmer Drought Index and the Texas Drought Preparedness Report, and monitor production figures quarterly. A summary of any drought conditions will be given to the Board of Directors in the annual report along with any recommendations and make necessary changes, as needed.</p>
17	<p>Plum Creek Conservation District</p> <p>MOB: The District will develop and adopt a Drought Management Strategy Plan for groundwater under the authority of the District within five years of the adoption and certification of this plan, and thereafter review it annually, and revise it if necessary. The plan will be implemented when specified conditions require. After its adoption, the Board will periodically review and update the Plan based upon the availability of additional scientific data collected by or presented to the Board.</p> <p>PS: 1. Development and adoption of a Drought Management Strategy Plan within five years of the adoption and certification of this plan.</p> <p>2. Review all of the conditions and requirements specified in the Drought Management Strategy Plan that would trigger implementation on an annual basis.</p> <p>3. Determine the necessity of a program to monitor rainfall for timing of effects on groundwater availability during droughts.</p>
18	<p>Post Oak Savannah Groundwater Conservation District</p> <p>MOB: The District will develop and adopt a Drought Management Strategy Plan within five years of the adoption and certification of this plan, review it annually, and revise it if necessary. The plan will be implemented when specified conditions require.</p> <p>PS: Development and adoption of a Drought Management Strategy Plan within five years of the adoption and certification of this plan.</p>

#	Table 11: Continued
19	<p>Rusk County Groundwater Conservation District</p> <p>MOB: The District will develop and adopt a Drought Contingency Plan for the Rusk County Groundwater Conservation District within one year of the adoption and certification of this plan, review it annually, and revise it if necessary.</p> <p>PS: A contingency plan to cope with the effects of water supply shortages due to climatic or other conditions will be developed by the District and will be adopted by the Board after notice and hearing. In developing the contingency plan, the District will consider the economic effects of conservation measures upon all water resource user groups, the local implications of the degree and effect of changes in water storage conditions, the unique hydro geologic conditions of the aquifer and the appropriate conditions under which to implement the contingency plan.</p> <p>a) Development and adoption of a Drought Contingency Plan within one year of the adoption and certification of this plan. b) The Annual Report to the Board of Directors of the District will reflect any implementations of the Drought Contingency Plan in that year. The report will include an appraisal of the plans effectiveness and suggestions for revisions to the plan.</p>
20	<p>Uvalde County Groundwater Conservation District</p> <p>MOB: Each year the District will provide education materials concerning waste, which is prohibited under the District rule, to the newspapers and to the general public on at least six occasions</p> <p>PS: (a) The District will provide to a newspaper of general circulation within the District at least six newspaper articles and/or public service announcements on an annual basis, including those that may be posted on the District's Web site.(b) The District will investigate all written reports of waste of groundwater within five working days from the date the report is filed with the District.</p>
21	<p>Wintergarden Groundwater Conservation District</p> <p>MOB: Each month the District will download the Palmer Drought Severity Index (PDSI) map and check the updates to the Drought Preparedness Council Situation Report posted on the Texas Water Information Network website www.txwin.net.</p> <p>PS: As required, the staff will assess the status of drought in the District and when needed, prepare a briefing with maps and situation reports for the Board of Directors. Monthly downloads will be filed for future use.</p>

5.7 Addressing Conservation, Recharge Enhancement, Rainwater Harvesting, Precipitation Enhancement, or Brush Control, Where Appropriate and Cost-Effective

All 21 GCDs addressed goal seven “*Addressing Conservation, Recharge Enhancement, Rainwater Harvesting, Precipitation Enhancement, or Brush Control, Where Appropriate and Cost-Effective.*”

We found that the Carrizo-Wilcox GCDs are not uniformly addressing this goal due to the varied conditions and aquifer characteristics in regions from northeast to southwest. For instance, according to the Pineywoods GCD, *“A small part of the northeast portion of Nacogdoches County is the outcrop of the Carrizo-Wilcox aquifer. This area of the county is rural and is the only recharge site for the Carrizo-Wilcox in the District. The main recharge areas lie in counties in the north and east of the Pineywoods GCD. From the information contained in the above report, the District has determined that for the reasons listed, recharge, natural or artificial, including precipitation enhancement, rainwater harvesting or brush control is not an appropriate management goal of the District at this time.”* The Brazos Valley GCD stated their management objective was to *“Determine if there are any natural spring flows within the District that may be impacted by increased groundwater pumping”* and the coinciding performance standard stated *“Annually monitor water levels in at least 2 wells near natural spring flows, if found, for potential impact from groundwater production. Prepare an annual assessment statement and include in annual report to the District Board of Directors.”* The Neches & Trinity Valleys GCD management objective stated *“Each year, on four or more occasions, the District will disseminate educational information relating to conservation practices for the efficient use of water resource,”* and the coinciding performance standard stated *“Number of occasions, annually, the District disseminated educational information relating to the conservation practices for the efficient use of water resources.”*

To present the diversity of these objectives presented in the management plans Table 12 was created to document the management objectives and performance standards. On a whole recharge enhancement and brush management were not generally supported objectives of the Carrizo-Wilcox GCDs. Only a few districts specifically stated they would participate in rain harvesting or precipitation modification programs.

	Table 12: Addressing Conservation, Recharge Enhancement, Rainwater Harvesting, Precipitation Enhancement, or Brush Control, Where Appropriate and Cost Effective
#	MOB= Management Objective PS=Performance Standard
1	Anderson County Underground Water Conservation District MOB: Each year, the District will require permits for all non-exempt use of groundwater in the District as defined in the District rules, in accordance with adopted procedures. PS: Each year, the downloaded PDSI maps and Situation Reports will be included in the District Annual Report to the Board of Directors.
2	Bluebonnet Groundwater Conservation District MOB: Conservation- The District will post an article or a link to an article annually, regarding water conservation on the District website www.bluebonnetgroundwater.org . PS: A copy of the article linked or posted on the District website regarding water conservation will be included in the Annual Report to the Board of Directors. MOB: Rainwater Harvesting- The District will post an article or a link to an article annually, regarding rainwater harvesting on the District website. PS: A copy of the article posted on the District website regarding rainwater harvesting will be included in the Annual Report to the Board of Directors.
3	Bee Groundwater Conservation District MOB: The District will cooperate with other interested parties and appropriate agencies to develop additional information on aquifer recharge. PS: A representative of the District will attend a meeting annually with interested parties and appropriate agencies.

#	Table 12: Continued
4	<p>Brazos Valley Groundwater Conservation District</p> <p>MOB: Determine if there are any natural spring flows within the District that may be impacted by increased groundwater pumping.</p> <p>PS: Annually monitor water levels in at least 2 wells near natural spring flows, if found, for potential impact from groundwater production. Prepare an annual assessment statement and include in annual report to the District Board of Directors.</p>
5	<p>Evergreen Underground Water Conservation District</p> <p>MOB: Each year the District will sample at least 40 water wells in the District for chemical analysis of water quality.</p> <p>PS: A table giving the results of the chemical analyses of the water quality samples taken by the District each year will be included in the Annual Report on District Activities made to the Board of Directors. A discussion of whether any instances of groundwater contamination or issues of concern were noted in the water quality sample analyses will be included in the Annual Report on District Activities made to the Board of Directors</p>
6	<p>Fayette County Groundwater Conservation District</p> <p>MOB: The District will develop and sponsor a water conservation education curriculum, available upon request for all schools within the District. The District will utilize the methodologies listed under Goal 5 in order to raise public awareness of the necessity and importance of a water conservation program.</p> <p>PS: Annually report to the Board of Directors on:</p> <ul style="list-style-type: none"> ♦ the number of schools where water conservation education curriculums are presented each year. ♦ the number of water conservation articles presented to the public via the various methodologies outlined in Goal 5. <p>Promote and/or implement groundwater banking, recharge projects, rainwater harvesting and aquifer storage and recovery projects, where appropriate and cost-effective, to address areas with declining groundwater levels. Promotion of these projects may be accomplished through articles published in at least one of the District's quarterly newsletters.</p>
7	<p>Gonzales Underground Water Conservation District</p> <p>MOB: The District will meet with Natural Resources Conservation Service representatives to exchange information on wells and water levels at least once annually.</p> <p>PS: Record the date and number of meetings with the Natural Resources Conservation Service representatives annually.</p> <p>MOB: The District will meet with the local Railroad Commission of Texas engineering technician at least once annually to review oil well permits and oil related activity that could endanger the aquifers.</p> <p>PS: Record the date and number of meetings with the Railroad Commission engineering technician annually.</p>

#	Table 12: Continued
8	Guadalupe County Groundwater Conservation District MOB: Each year the District will evaluate all proposed new wells prior to drilling. Information submitted by the applicant will be evaluated in order assess water level impacts within the District. PS: A monthly report to the Board will be made on the results of all water level impact studies and number of wells evaluated each month
9	Live Oak Groundwater Conservation District MOB: Participate in the South Texas Weather Modification Program MOB: Evaluate the performance of the weather modification program PS: District representative will attend 1 meeting of the South Texas Weather Modification Assn. Annually
10	Lost Pines Groundwater Conservation District MOB: To provide information to the public about the status of groundwater use, availability, and water levels and a description of natural resource issues, e.g., mining, out of District transport of groundwater, protection of endangered species, or the spread of phreatophytic vegetation, that impact the use and availability of groundwater or which are affected by the use and availability of groundwater. PS: At least annually, the General Manager shall prepare a report for the LPGCD board on precipitation amounts as compared to water levels within the District and a description of apparent trends. Once this report is reviewed and accepted by the LPGCD Board, it shall be made available to the public at the District's office. In addition, the General Manager will cause a summary of the annual report to be published in one or more newspapers of general circulation in Bastrop and Lee counties. The summary may be published in conjunction with the publication of the summary of natural resource issues. In addition, to the extent practical, the LPGCD will sponsor or co-sponsor workshops open to the public that address this issue and similar issues.
11	McMullen Groundwater Conservation District MOB: The District will cooperate with other interested parties and appropriate agencies to develop additional information on aquifer recharge. PS: A representative of the District will attend a meeting annually with interested parties and appropriate agencies.
12	Medina County Groundwater Conservation District MOB: The District will annually submit an article regarding water conservation for publication to at least one newspaper of general circulation in Medina County. PS: A copy of the article submitted by the District for publication to a newspaper of general circulation in Medina County regarding water conservation will be included in the Annual Report to the Board of Directors.

#	Table 12: Continued
13	<p>Mid-East Groundwater Conservation District</p> <p>MOB: The District will at least annually conduct a least one program to provide public information and education to promote the conservation of water. Such programs may include newspaper publication, open meetings, handout brochures and mail-out brochures.</p> <p>PS: The District will document the number of times this activity was completed in the annual report to the Board of Directors and maintain a record of the above for subsequent audits.</p>
14	<p>Neches & Trinity Valleys Groundwater Conservation District</p> <p>MOB: Each year, on four or more occasions, the District will disseminate educational information relating to conservation practices for the efficient use of water resources.</p> <p>PS: Number of occasions, annually, the District disseminated educational information relating to the conservation practices for the efficient use of water resources.</p>
15	<p>Panola County Groundwater Conservation District</p> <p>MOB: The District will promote conservation at least once during each fiscal year by one of the following methods: a. distribute literature packets or brochures; b. conduct public presentations; c. sponsor an educational program/curriculum; d. provide information on the District's web site; e. submit newspaper articles to local newspaper for publication; f. present displays at local public events; g. annually conduct a local contest on water conservation; or h. conduct classroom presentations on conservation.</p> <p>PS: The District's Annual Report will provide a summary of the District efforts and a copy of any information provided by the District to the public during the previous fiscal year to promote conservation.</p> <p>MOB: The District will provide information relating to recharge enhancement on the District web site at least one time each fiscal year.</p> <p>PS: Each year, the District's Annual Report will include a copy of the information that has been provided on the District web site relating to recharge enhancement.</p> <p>MOB: The District will advocate rainwater harvesting each year by providing updated information about rainwater harvesting on the District web site at least once each fiscal year.</p> <p>PS: The Annual Report for the District will include a copy of the information on rainwater harvesting which has been provided on the District web site within the previous fiscal year.</p>
16	<p>Pineywoods Groundwater Conservation District</p> <p>Management Goal: Prevent unnecessary waste of the groundwater and encourage</p> <p>MOB: Maintain a constant review of all projects to ensure that they are using the best available technology. Publish a newsletter at least quarterly and include some educational information to promote conservation. Provide public education at any opportunity to promote conservation.</p> <p>PS: Annually review all projects to determine if they are using best available technology and if educational materials are benefiting the conservation program. This review will be included in the annual report to the Board of Directors.</p>

#	Table 12: Continued
17	<p>Plum Creek Conservation District</p> <p>MOB: 1. Each year the District will confer at least once with a representative of the Railroad Commission of Texas (RCT) on the impact of oil and gas production or waste and disposal operations associated with oil and gas production on groundwater availability and quality, as well as the impact of groundwater production on the production of oil and gas in the District.</p> <p>2. Also, during each year the District will evaluate all permit applications for new production injection or disposal wells permitted by the Railroad Commission, if any are filed, and the information submitted by the applicants on those wells prior to drilling, in order to assess the impact of these wells on the groundwater resources in the District.</p> <p>PS: 1. The number of conferences with a representative of the Texas RCT each year;</p> <p>2. The addition of available RCT well data to the District's database;</p> <p>3. Monthly reports to the PCCD Board of Directors on the number of new well permit applications filed, and the possible impacts of those new wells on the groundwater resources in the District; and</p> <p>4. Annual reports to the Board about consumption and use of groundwater for commercial purposes, including irrigation uses and enhanced oil and gas production when information is available.</p>
18	<p>Post Oak Savannah Groundwater Conservation District</p> <p>MOB: The District will develop and adopt a Drought Management Strategy Plan within five years of the adoption and certification of this plan, review it annually, and revise it if necessary. The plan will be implemented when specified conditions require.</p> <p>PS: Development and adoption of a Drought Management Strategy Plan within five years of the adoption and certification of this plan.</p>
19	<p>Rusk County Groundwater Conservation District</p> <p>MOB: Public education on groundwater conservation.</p> <p>PS: The District will issue at least two articles per year in Rusk County newspapers and on the District internet website regarding water conservation issues applicable to the residence of Rusk County. Tracking Method: Copies of the articles posted on the District website regarding groundwater conservation will be included in the Annual Report to the Board of Directors.</p>
20	<p>Uvalde County Underground Water Conservation District</p> <p>MOB: The District will annually submit an article regarding water conservation for publication to at least one newspaper of general circulation in Uvalde County.</p> <p>PS: A copy of the article submitted by the District for publication to a newspaper of general circulation in Uvalde County regarding water conservation will be included in the Annual Report to the Board of Directors.</p>
21	<p>Wintergarden Groundwater Conservation District</p> <p>MOB: Each year the District will insure that all new wells permitted for construction within the District, comply with the District construction standards through monitoring of the State of Texas water well report required to be provided to the District by water well drillers.</p> <p>PS: The number of newly permitted water wells within the District monitored for compliance will be reported to the Board annually.</p>

Conclusions

This study evaluated the state of current regulations, scientific research, and rulemaking processes established by Texas GCDs that have a responsibility to protect and conserve groundwater resources of the Carrizo-Wilcox Aquifer. The study provided an opportunity for all involved parties to provide feedback and information through two surveys. Numerous source documents provided by the GCDs were reviewed to achieve the study objectives. This study benefited from the cooperation and coordination of local and state agencies, including the Bureau of Economic Geology, the Texas Commission on Environmental Quality, the Texas Water Development Board, and the 16 GCDs that participated in the survey. The following provides the primary conclusions for each of the issues addressed in the study.

Through the 65 responses received from the Interested Parties Survey, it became evident that there were broad concerns about groundwater management and protection issues. These concerns were brought forth by municipalities, water purveyors, environmental interests, private property owners, agricultural interests, manufacturing interests, energy sector interests and county GCDs. These concerns are characterized as the following:

- Water purveyors concerned about the future of groundwater permitting regulations, production rules, and management practices.
- Environmental interests perceive that there is a lack of consideration of environmental flows, including spring flows and base flows to streams and rivers as a component of the groundwater budget.

- Citizens are concerned about property rights being violated by the GCDs that regulate a landowner's groundwater production and exportation of groundwater outside of their jurisdiction.
- Compatibility among neighboring GCDs and potential for conflict among GCDs was a concern because there is the perception that GCDs do not effectively communicate and coordinate transboundary management issues.
- GCDs reported a lack of current, readily available groundwater science to support them in making important short-term and long-term decisions.
- Water purveyors and GCDs brought forth concerns about regulatory gaps among agencies including the Railroad Commission of Texas and the Texas Divisions of Licensing and Registration that could lead to the contamination of the recharge zone and production areas of the Carrizo-Wilcox Aquifer. The primary concern is the potential for pollution from abandoned water or oil/gas wells and orphaned oil/gas wells, where the responsible party is unknown, unable, or unwilling to assume the financial responsibility to plug the wells.
- Concerns about potential contamination of the recharge zone of the Carrizo-Wilcox Aquifer by strip mining of lignite coal in the eastern part of Texas.

Chapter 36 of the Texas Water Code specifically enables GCDs to be created and authorizes district rulemaking and enforcement authority per §36.101. Further, the Texas Water Code, per §36.1071, requires GCDs to adopt rules to implement a management plan. In the Texas Water Code there is a distinct relationship between the Texas Water Development Board and GCDs. §16.012 and §36.108(d) of the code requires the Texas

Water Development Board to provide groundwater availability models of major and minor aquifers to the GCDs and then under section §36.1071(h) the code requires districts to use the groundwater availability models in development of the management plan.

This review found that of the 16 GCDs that responded to the Carrizo-Wilcox Aquifer study survey, all had rules and management plans with linkages to sound scientific resources from the Texas Water Development Board or local, site-specific information.

As a whole when GCDs held open or closed session meetings the secretaries did not consistently enter in to the public record when scientific resources were being consulted and deliberated. GCDs cited and incorporated information from the groundwater management joint planning sessions for use in establishing their own local management plans.

- Groundwater conservation districts worked with consultants to develop rules and management plans.
- GCDs received presentations from various speakers, including the Texas Water Development Board.
- Well monitoring and data collection programs were designed to support and trigger contingency plans.
- Some GCDs are making rules to limit groundwater exportation/transfer rules based upon groundwater availability and regional water planning demand projections.
- GCDs did document if they received approval from the executive administrator of Texas Water Development Board to utilize groundwater science that is in addition to,

or in lieu of, the TWDB groundwater availability models as stated in the Texas Water Code under sections §36.1071(h) and §36.108(d).

The survey found that limited enforcement actions were taken by the 21 GCDs that have jurisdictional authority over the Carrizo-Wilcox Aquifer. Only 16 GCDs responded to the survey, and three reported that they carried out formal enforcement actions. Violations were resolved by correction of the problems. A majority of the violations were by water well drillers or property owners for not submitting permits, well records, or other administrative information. Two violations were issued to oil and gas producers for groundwater well production permits, but none for groundwater pollution or diminution of water supplies. All enforcement actions were instances of positive enforcement (intentionally punitive). Based on a review of other documentation submitted as part of this study, such as GCD Board meeting minutes, it appears that there have been numerous violations of rules within certain GCDs, but in all but one case, based on the meeting minutes, it appears that violations were resolved informally.

The regional and state water plans and GCD management plans were evaluated to identify conflicts that may exist between the two planning processes.

- Water supplies have to be legally available (i.e., permits obtained) and infrastructure to transport the water to the current or future users has to be in place for the water to be counted as a current water supply.
- Of the 56 counties analyzed that are included as a current supply or water management strategy in the 2011 regional water plans and have an estimate of managed available groundwater (the total amount of pumping consistent with the

desired future condition) from the recently completed joint planning process, 20 counties have the potential for conflict and of those counties five are not within the jurisdiction of a GCD. Absent a GCD, there is no mechanism to implement management activities to achieve the desired future condition.

- The net budget for Groundwater Management Area 13 is negative, (84,793) acre-feet per year in 2010 and negative (158,902) in 2060. Based on this analysis, if the estimates of managed available groundwater remain the same in the 2016 regional water plans as they are today, then the volume of water from Carrizo-Wilcox Aquifer recommended to meet future water supply needs will have to be reduced significantly.
- No water management strategies utilizing brackish groundwater for the Carrizo-Wilcox Aquifer are planned for implementation prior to 2020.
- Six counties are scheduled to receive brackish groundwater supplies based on recommended water management strategies in the 2011 regional water plans including: Bexar, Comal, Guadalupe*, Hays, Maverick, and Wilson counties, with the majority going to Bexar County. *indicates a Carrizo-Wilcox Aquifer survey county.

The management goals established under the Texas Water Code, section §36.107 were used to evaluate and characterize the ability of the GCD plans to conserve and protect the aquifer. Twenty-one complete sets of management plans and 20 sets of rules were evaluated and compared. Management plans were evaluated by indentifying the management objective and corresponding performance standard.

- Approaches to providing the most efficient use of groundwater, if achieved, within the GCDs were varied, largely because of diverse regional socio-economic and developmental pressures and environmental concerns represented in the three different groundwater management areas and 21 GCDs.
- Based on a review of groundwater management plans and rules, no compatibility issues were identified within groundwater management areas and among existing Carrizo-Wilcox Aquifer GCDs. However, there will always be the potential for conflict and incompatibility between adjacent counties where one county is within a GCD and a neighboring county is not.
- GCDs throughout the three groundwater management areas have adopted different methods of addressing the management of groundwater resources to prevent and control the waste of groundwater.
- GCDs established objectives and performance standards that are geared towards influencing the public's perception and consumption practices through education, collection of basic groundwater data for use during development of policy or regulations, and taking physical steps to regulate groundwater consumption via establishment of well permitting, registration, and metering programs.
- Regional Water Planning Groups and river authorities are the focal points for the coordination of groundwater and surface water issues for Carrizo-Wilcox GCDs.
- GCDs take varied approaches to managing drought, the most common approach was to monitor the Palmer Drought Severity Index. The performance standards varied from

simple reports to the board to the activation of contingencies that include the curtailment of groundwater production.

This study details the complex and dynamic environment of groundwater management among GCDs that overlie the Carrizo-Wilcox Aquifer in Texas. Continued communication, cooperation, and coordination will be required to achieve water management strategies at every level of government within Texas. Continued development of scientific resources is essential to the decision-making process for the GCDs. The assertion can be made that the most important principle moving forward for groundwater management will be communication between local leaders and the citizens, because without proper communication, none of the rules or management plans set forth will be effectively adopted or implemented.

Appendix: Groundwater Conservation District Management Plans

Appendix. Anderson Groundwater Conservation District			
#	Goal	Management Plan Objectives	Performance Standards
A1	Providing the Most Efficient Use of Groundwater	The District will begin a process to register all wells within the District's jurisdiction	Each year, beginning in FY09, the number of new and existing wells registered with the District will be presented in the District's annual report
A2	Controlling and Preventing Waste of Groundwater	Each year the District will disseminate educational information on eliminating and reducing the wasteful use of groundwater focusing on water quality protection. This may be accomplished annually by two of the following methods: a. Conduct an annual contest on water quality protection b. Compile literature packets for distribution to schools in Anderson County c. Conduct classroom presentations d. Sponsor an educational program/curriculum e. Post information on the District's website f. Provide newspaper articles for publication g. Publish District newsletter h. Conduct public presentations i. Set up displays at public events j. Distribute brochures/literature	The annual report will include a summary of the District activities during the year to disseminate educational information on eliminating and reducing the wasteful use of groundwater focusing on water quality protection.
A3	Addressing Conjunctive Surface Water Management Issues	Each year, the District will participate in the regional planning process by attending at least one meeting of the regional water-planning group per fiscal year.	Each year, attendance at Region I meetings by a representative of the District will be reflected in the District's annual report and will include the number of meetings attended and the dates.
B1	Controlling and preventing Subsidence	Each year, the District will manage the withdrawal of groundwater.	Each year, attendance at GMA 11 meetings by a representative of the District will be reflected in the District's annual report and will include the number of meetings attended and the dates.
B2	Addressing natural resource issues which impact the use and availability of groundwater, and which are impacted by the use of groundwater	Each year, the District will require permits for all non-exempt use of groundwater in the District as defined in the District rules, in accordance with adopted procedures.	Each year, a summary of the number of applications for the drilling of non-exempt wells, the number of applications for the permitted use of groundwater and the disposition of the applications will be presented in the District's annual report.

Appendix. Anderson Groundwater Conservation District			
C1	Addressing Drought Conditions	Each month, the District will download the updated Palmer Drought Severity Index (PDSI) map and check for the periodic updates to the Drought Preparedness Council Situation Report posted on the Texas Water.	Each year, the downloaded PDSI maps and Situation Reports will be included in the District Annual Report to the Board of Directors.
D1	Addressing Conservation, Recharge Enhancement, Rainwater Harvesting, Precipitation Enhancement, or Brush Control, Where Appropriate and Cost Effective	<p>Each year, the District will promote conservation by one of the following methods:</p> <ul style="list-style-type: none"> a. Conduct an annual contest on water conservation b. Distribute conservation literature packets to schools in Anderson County c. Conduct classroom conservation presentations d. Sponsor and educational conservation program/curriculum e. Post conservation information on the District's website f. Provide a newspaper article on conservation for publication g. Publish an article on conservation in the District newsletter h. Conduct a public conservation presentation i. Set up a conservation display at a public event j. Distribute conservation brochures/literature to the public <p>Each year, the District will provide information relating to recharge enhancement and brush control on the District's website. Performance Standard: Each year, the District annual report will include a copy of the information that has been provided on the District's website relating to recharge enhancement and brush control</p>	Each year, the annual report will include a copy of the information on rainwater harvesting that is provided on the District's website.
D2	Addressing in a Quantitative Manner the Desired Future Conditions of the Groundwater Resources	This category of management goal is not applicable to the District because the desired future condition of the groundwater resources in GMA 11 has not been defined. The District intends to coordinate with other groundwater conservation districts in GMA 11 to define the desired future conditions of the aquifers, as required by TWC 36.108. The District also intends to review and evaluate the GAM simulation results and other available data by September 1, 2010 to determine if revisions are needed regarding the total aquifer storage and groundwater availability.	

Appendix. Bee Groundwater Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	Providing the most efficient use of groundwater	Each year the District will provide education materials concerning the efficient use of groundwater.	Provide educational materials to at least one school annually
B1	Controlling and preventing waste of groundwater	Measure water levels from the land surface on strategic wells on an annual basis and report waste to the District Board.	(a) Report to the District Board annually the number of water level measurements. (b) The District will investigate all reports of waste of groundwater within five working days. The number of reports of waste as well as the investigation findings will be reported to the District Board in the annual report.
C1	Natural Resource Issues	The District will cooperate with other interested parties and appropriate agencies to develop additional information on aquifer recharge.	A representative of the District will attend a meeting annually with interested parties and appropriate agencies.
D1	Drought Conditions	The District will monitor the Palmer Drought Severity Index (PDSI).	A report of the Palmer Drought Severity Index will be presented to the District board on an annual basis.
E1	Conservation	Each year the District will make educational material to the public promoting conservation methods and concepts.	The District will make at least one educational brochure available per year through service organizations, and on a continuing basis at the District office.
F1	Precipitation Enhancement	The District will participate in the South Texas Weather Modification Program.	A district representative will attend a meeting of the South Texas Weather Modification Assn. annually.

Appendix. Bluebonnet Groundwater Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	Providing for the Most Efficient Use of Groundwater in the District	Each year, the District will require all new exempt or non-exempt wells that are constructed within the boundaries of the District to be registered with the District in accordance with the District rules.	Each Year the number of exempt and non-exempt wells registered by the District for the year will be incorporated into the Annual Report submitted to the Board of Directors of the District.
B1	Controlling and Preventing the Waste of Groundwater in the District	Each year, the District will make an evaluation of the District Rules to determine whether any amendments are recommended to decrease the amount of waste of groundwater within the District.	The District will include a discussion of the annual evaluation of the District Rules and the determination of whether any amendments to the rules are recommended to prevent the waste of groundwater in the Annual Report of the District provided to the Board of Directors.
B2		Each year, the District will provide information to the public on eliminating and reducing wasteful practices in the use of groundwater posting information or a link to information on groundwater waste reduction on the District's website.	Each year, a copy of the information provided on groundwater waste reduction on the District's website will be included in the District's Annual Report provided to the District Board of Directors.
C1	Conjunctive Surface Water Management Issues	year, the District will participate in the regional planning process by being represented at the Region G and Region H Regional Water Planning Group meetings.	The attendance of a District representative to at least 50 percent of the Region G and Region H Regional Water Planning Group meetings will be noted in the Annual Report presented to the District Board of Directors.
D1	Addressing Drought Conditions	Each month, the District will download available drought information, for the counties in the District, from available websites on the internet.	Quarterly, the District will make an assessment of the status of drought in the District and prepare a quarterly briefing for the Board of Directors. The downloaded maps, reports and information will be included with copies of the quarterly briefings, in the District Annual Report to the Board of Directors.

Appendix. Bluebonnet Groundwater Conservation District			
E1	Addressing Conservation	The District will post an article or a link to an article annually, regarding water conservation on the District website www.bluebonnetgroundwater.org .	A copy of the article linked or posted on the District website regarding water conservation will be included in the Annual Report to the Board of Directors.
F1	Rainwater Harvesting	The District will post an article or a link to an article annually, regarding rainwater harvesting on the District website www.bluebonnetgroundwater.org .	A copy of the article posted on the District website regarding rainwater harvesting will be included in the Annual Report to the Board of Directors.

Appendix. Brazos Valley Groundwater Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	Implement Strategies Providing For the Most Efficient Use of Groundwater	Require all existing and new non-exempt wells constructed within the boundaries of the District to be permitted by the District and operated in accordance with District Rules. In addition, the District will encourage all exempt wells constructed within the District boundaries to be registered with the District.	The number of exempt and permitted wells registered within the District will be reported annually in the District's Annual Report submitted to the Board of Directors of the District.
A2		Regulate the production of groundwater by permitting wells within the District's boundaries based on beneficial use and in accordance with District Rules. Each year the District will accept and process applications for the permitted use of groundwater in the District, in accordance with the permitting process established by District Rules. The District will regulate the production of groundwater from permitted wells by verification of pumpage volumes using meters, if meters are required under the District Rule and/or permit for the wells.	The number and type of applications made for the permitted use of groundwater in the District, the number and type of permits issued by the District, and the amount of groundwater permitted, will be included in the Annual Report given to the Board of Directors. The actual annual pumpage from each metered well within the District will be reported annually and compared to the amount permitted for that well. This information will be included in the District's Annual Report submitted to the Board of Directors of the District.

Appendix. Brazos Valley Groundwater Conservation District			
A3		Conduct ongoing monitoring of the aquifers underlying the District and the current groundwater production within the District, and then assess the available groundwater that can be produced from each aquifer within the District after sufficient data are collected and evaluated. Using this data and information developed for GMA-12 the District will re-evaluate availability goals as necessary and will permit wells in accordance with the appropriate production goals.	The District will conduct the appropriate studies to identify the issues and criteria needed to address groundwater management needs within the District's boundaries. Groundwater availability goals will take into consideration the GMA-12 Planning and research of the hydro-geologic and geologic characteristics of the aquifers, which may include, but not necessarily be limited to, the amount of water use, water quality, and water level declines. A progress report on the work of the District regarding the groundwater availability will be written annually, as substantial additional data are developed. The progress report will be included in the annual report to the District Board of Directors.
B1	Implement Strategies to Control and Prevent Waste of Groundwater:	Apply a water use fee to the permitted use of groundwater in the District to encourage conservation-oriented use of the groundwater resources to eliminate or reduce waste.	Each year the District will apply a water use fee to the non-exempt permitted use of groundwater produced within the District pursuant to District rules. The amount of fees generated and the amount of water produced for each type of permitted use will be a part of the Annual Report presented to the District Board of Directors.
B2		Evaluate District rules annually to determine whether any amendments are necessary to decrease the amount of waste within the District.	The District will include a discussion of the annual evaluation of the District rules, and the determination of whether any amendments to the rules are necessary to prevent the waste of groundwater in the Annual Report of the District provided to the Board of Directors.

Appendix. Brazos Valley Groundwater Conservation District			
B3		Provide information to the public and the schools within the District on the wise use of water to eliminate and reduce wasteful practices.	The District will include a page on the District's web-site devoted to the wise use of water and providing tips to help eliminate and reduce wasteful use of groundwater annually. The District will provide information to local school districts including providing book covers to encourage wise use of water.
C1	Implement Strategies to Address Conjunctive Surface Water Management Issues:	Encourage the use of surface water supplies where available, to meet the needs of specific user groups within the District.	The District will participate in the Region G - Regional Water Planning process by attending at least one RWPG meeting annually and will encourage the development of surface water supplies where appropriate. This activity will be noted in the Annual Report presented to the District Board of Directors.
D1	Implement Strategies to Address Natural Resource Issues which Impact the Use and Availability of groundwater, and which are Impacted by the Use of Groundwater	Determine if there are any natural spring flows within the District that may be impacted by increased groundwater pumping.	Annually monitor water levels in at least 2 wells near natural spring flows, if found, for potential impact from groundwater production. Prepare an annual assessment statement and include in annual report to the District Board of Directors.

Appendix. Brazos Valley Groundwater Conservation District			
E1	Implement Strategies to Address Drought Conditions:	A District staff member will download at least one Palmer Drought Severity Index (PDSI) map monthly. The Palmer Drought Severity Index map will be used to monitor drought conditions and notify permit holders of severe drought conditions when the PDSI is at 3.0 or below (Severe Drought) for more than 2 consecutive months.	The District will make an assessment of drought conditions in the District and will prepare an annual briefing to the Board of Directors.
E2		Require 100 percent of water producers that are required by the state of Texas to have drought contingency plans, to submit those plans to the District when applying for a permit for well production from the District.	Review 100 percent of the drought contingency plans submitted as a result of permit requirements whenever a severe drought condition is reached as determined by the PDSI. The number of drought contingency plans required to be submitted by water producers to the District as part of the well permitting process and the number of drought contingency plans actually submitted to the District will be reports in the annual report to the District Board of Directors.
E3		Develop a District drought contingency plan. The target goal for developing the plan is June 2010. The drought contingency plan will be reviewed for effectiveness and needed updates once annually.	A report summarizing the findings of the annual review of the District drought contingency plan will be included in the annual report of the District Board of Directors.
F1	Implement Strategies to Promote Water Conservation:	Require 100 percent of the water producers requesting a permit for water production within the District to submit a water conservation plan unless one is already on file with the District at the time of the permit application, or agree to comply with the District's adopted Water Conservation guidelines.	Review 100 percent of the water conservation plans submitted as a result of permit requirements to ensure compliance with permit conditions. The number of water conservation plans required to be submitted by water producer to the District as part of the well permitting process and the number of water conservation plans actually submitted to the District will be reported in the annual report to the District Board of Directors. If the a water producer chooses to agree to follow the District's adopted Water Conservation guidelines in lieu of submitting a Water Conservation Plan, then that number will be indicated in the annual report to the District Board of Directors.

Appendix. Brazos Valley Groundwater Conservation District			
F2		Develop a system for measurement and evaluation of groundwater supplies.	Water level monitoring wells will be identified for and the Brazos River Alluvium, the Yegua-Jackson, Sparta, Queen City, Carrizo, Calvert Bluff, Simsboro and Hooper aquifers at least 2 wells per aquifer will be monitored on an annual basis to track changes in static water levels.
F3		Assist in obtaining grant funds for the implementation of water conservation methods. Work with the appropriate state and federal agencies to facilitate bringing grant funds to various groups within the District boundaries to develop and implement water conservation methods. The District will meet with at least one state or federal agency annually in order to discuss bringing water conservation methods grant funds into the District.	The number of meetings held annually with at least one state or federal agency and the number of grants for water conservation methods applied for and obtained will be included in the annual report to the District Board of Directors.
G1	Implement Strategies to Protect Water Quality:	Develop baseline water quality data and a system for continued evaluation of groundwater quality.	Develop general understanding of water quality within aquifers in the District based on TCEQ and TWDB data. Develop response plan for potential water quality issues.
G2		Require all water producers that are required by the TCEQ to have well vulnerability studies prior to constructing a well, to provide evidence of the study to the District prior to construction of a well within the District.	Review all vulnerability studies submitted as result of permit requirements to help ensure water quality protection.
G3		Provide information to the public and the schools within the District on the importance of protecting water quality.	The District will include a page on the Districts web-site devoted to water quality issues and will provide information to water producers on wellhead protection programs.
H1	Desired Future Conditions	The desired future conditions of the groundwater within the District have not yet been established in accordance with Chapter 36.108 of the Texas Water Code. The District is actively participating in the joint planning process and the development of desired future conditions for the parts of the aquifers within the District. Therefore, this goal is not applicable to the District at this time.	

Appendix. Evergreen Underground Water Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	ADDRESSING THE EFFICIENT USE OF GROUNDWATER	Each month the District will monitor the volume of water produced from nine irrigation wells and make note of the crops irrigated by the wells to promote water conservation in irrigation practices.	A table of the monthly meter readings from the nine irrigation wells and a discussion of the irrigation application rates for each type of crop irrigated by the nine wells monitored by the District will be included in the Annual Report on District Activities made to the Board of Directors each year.
A2		Each month the District will monitor the volume of water produced 35 municipal and Rural water suppliers in the District.	A table showing the monthly production volumes reported to the District by the Municipal and Rural water suppliers in the District will be included in the Annual Report on District Activities made to the Board of Directors each year.
A3		Each year the District will request production reports from the operators 800 agricultural irrigation wells in the District.	A copy of the request for production reports sent to the operators of agricultural irrigation wells will be included in the Annual Report on District Activities made to the Board of Directors each year. A table showing the production volumes reported to the District from the agricultural irrigation well operators in the District will be included in the Annual Report on District Activities made to the Board of Directors each year.

Appendix. Evergreen Underground Water Conservation District			
A4		Each month the District will measure the water levels in 45 water wells and will measure the water level of an additional 126 wells on an annual basis each year.	A table showing the monthly and a table showing the annual water level measurements made by the District will be included in the Annual Report on District Activities made to the Board of Directors each year.
B1	ADDRESSING THE CONTROL AND PREVENTION OF THE WASTE OF GROUNDWATER	Each year the District will conduct an on-site investigation of any reports of waste of groundwater within two working days of the time of the receipt of the report to the District.	A discussion of the waste of groundwater observed by the District each year, including the number of reports of the waste of groundwater received by the District and the District response to the report will be included in the Annual Report on District Activities made to the Board of Directors each year.
C1	ADDRESS THE CONJUNCTIVE USE OF SURFACE AND GROUNDWATER	Each year the District will use the Southern Carrizo-Wilcox Groundwater Availability Model to predict the potential effects of different groundwater pumping scenarios on both groundwater and surface water. In addition, each year the District will arrange to meet with the appropriate surface water management entities.	A summary of the discussion(s) with the surface water management entities for status on surface water conditions will be relayed in a memorandum to the Board of Directors each year.
D1	Addressing natural resource issues which impact the use and availability of groundwater, and which are impacted by the use of groundwater	Each year the District will sample at least 40 water wells in the District for chemical analysis of water quality.	A table giving the results of the chemical analyses of the water quality samples taken by the District each year will be included in the Annual Report on District Activities made to the Board of Directors. A discussion of whether any instances of groundwater contamination or issues of concern were noted in the water quality sample analyses will be included in the Annual Report on District Activities made to the Board of Directors.

Appendix. Evergreen Underground Water Conservation District			
E1	Addressing conservation	Each year, the District will submit an article for publication regarding water conservation to one newspaper of general circulation in the District.	A copy of the article regarding water conservation submitted by the District for publication to a newspaper of general circulation in the District will be included in the Annual Report to the Board of Directors.
E2		Each year, the District will include an informative flier on water conservation with at least one mail-out distributed in the normal course of business to groundwater use permit holders in the District.	The Annual Report to the Board of Directors will include a copy of the informative flier regarding water conservation that was distributed to groundwater use permit holders in the District and the number of fliers distributed.
F1	Addressing drought conditions	Each month, the District will download at least one updated Palmer Drought Severity Index (PDSI) map posted on the National Weather Service - Climate Prediction Center website (http://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml) and check for the periodic updates to the Drought Preparedness Council Situation Report (Situation Report) posted on the Texas Department of Public Safety website (http://www.txdps.state.tx.us/dem/sitrepindex.html).	Quarterly, the District will make an assessment of the status of drought in the District and prepare a quarterly briefing to the Board of Directors. The downloaded PDSI maps and Situation Reports will be included with copies of the quarterly briefing in the District Annual Report to the Board of Directors.
G1	Addressing in a quantitative manner the desired future conditions	The development of DFCs is also considered to be a goal for each GCD, in accordance with chapter 36 of the water code. Since coordination with GMA 13 and GMA 15 is ongoing but not yet complete, the district has determined this goal to not be applicable at this time.	

Appendix. Fayette Groundwater Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	Management Strategies to Protect and Enhance the Quantity of Useable Groundwater by Encouraging the Most Efficient Use	<i>Establish a Water Level Monitoring Program:</i> Establish a water level monitoring network by first, identifying the wells to be monitored, and secondly, by annually measuring the depth to water in those wells; record all measurements and/or observations; enter all measurements into District's computer data base; file specific locations of wells in the District's filing system. Establish a baseline by using existing wells, preferably those for which the District already has some historical data, in all major and minor aquifers where wells are available.	Annually report to the Board of Directors on: ♦ the percent of water level monitoring wells for which measurements were recorded each year. ♦ the number of data records entered into District's data base each year. ♦ the number of wells in the water level measurement network each year. ♦ the number of wells added to the network, if required, each year.
A2		<i>Set and Enforce Maximum Allowable Production Limits:</i> Annually, the District will investigate all reports filed by District constituents, on forms provided by the District, regarding pumpage of groundwater in excess of the maximum production allowable under the District's rules. Investigation of each occurrence shall occur within 30 days of receiving the report. Each case will be remedied in accordance with District rules.	Annually report to the Board of Directors on: ♦ the number of reports investigated each year. ♦ the average amount of time taken to investigate reports each year. ♦ the number of incidences where violations occurred and violators were required to change operations to be in compliance with District rules each year.

Appendix. Fayette Groundwater Conservation District			
A3		<p><i>Implement Well Permitting Process:</i> Issue water well drilling permits for the drilling and completion of non-exempt water wells in the District within 30 days of application, or as soon thereafter as possible. Randomly inspect new well drilling sites to be assured that the District's completion and spacing standards are met. Send written notification to the well owner if the well fails to meet standards within 30 days of inspection. The Board will vote on final approval of the permit at the next scheduled meeting and insure that well completion standards have been met.</p>	<p>Annually report to the Board of Directors on:</p> <ul style="list-style-type: none"> ◆ the number of permits issued each year in Fayette County. ◆ the number of on-site inspections performed of all wells for which District staff have reason to question compliance with District rules. ◆ the number of permits field checked each year. ◆ the number of letters mailed to permit applicants requesting applicant to provide additional information or make changes to comply with District rules. ◆ the number of these letters which result in changes to comply with District rules and the number of cases still open at year-end.
B1	<p>Management Strategies to Protect and Enhance the Quantity and Quality of Useable Groundwater by Controlling and Preventing Contamination and Waste</p>	<p><i>Establish a Water Quality Monitoring Program:</i> The District staff will obtain water quality samples for analysis from wells within the monitoring network in order to track water quality changes in the District, and will resample a representative group of the wells sampled the previous year. The results of the tests will be published and entered in to the District's computer data base, and will be made available to the public.</p>	<p>Annually report to the Board of Directors on:</p> <ul style="list-style-type: none"> ◆ the number of samples collected and analyzed each year ◆ the percent of previously sampled wells that were sampled in the current testing year. ◆ the number of analyses entered into District's computer data base each year.

Appendix. Fayette Groundwater Conservation District			
B2		<p><i>Assure Proper Closing, Destruction, or Re-Equipping of Wells:</i> The District staff will inspect all sites reported as being open or improperly covered in a timely manner and follow through to assure proper closing or repair.</p>	<p>Annually report to the Board of Directors on:</p> <ul style="list-style-type: none"> ◆ the number of open, improperly covered, or deteriorated wells reported and inspected each year. ◆ the number of letters of notification of an open hole or deteriorated well mailed to well owners and/or operators each year. ◆ the number of wells the District required to be closed each year.
B3		<p><i>Encourage Plugging of Abandoned Wells:</i> Field inspect each reported well abandoned or replaced, and assure proper closing under Water Well Drillers' Rules or that the well is re-equipped in accordance with District rules.</p>	<p>Annually report to the Board of Directors on:</p> <ul style="list-style-type: none"> ◆ the number of reported wells abandoned or replaced each year. ◆ the number of reported wells destroyed and noted on the topographic map each year. ◆ the number of reported wells re-equipped in accordance with the District's rules each year.
B4		<p><i>Control and Prevention of Water Waste:</i> The District will investigate all identified wasteful practices within a reasonable number of working days of identification or complaint received, depending upon the magnitude of the wasteful practice.</p>	<p>Annually report to the Board of Directors on: ◆</p> <ul style="list-style-type: none"> the number of wasteful practices identified and the average number of days District personnel took to respond or investigate after identification or complaint received. ◆ the actions taken to resolve the identification or complaint received.

Appendix. Fayette Groundwater Conservation District			
C1	Management Strategies Under Drought Conditions	<i>Curtailment of Groundwater Withdrawal:</i> The annual amount of groundwater permitted by the District for withdrawal from the portion of the aquifers located within the District may be curtailed during periods of extreme drought in the recharge zones of the aquifers or because of other conditions that cause significant declines in groundwater surface elevations. Such curtailment may be triggered by the District's Board based on the groundwater elevation measured in the District's monitoring well(s).	The District shall monitor at least one well each year. Annually report to the Board of Directors the number of measurements obtained from the water level monitoring network. A summary report of the water level measurement results and an analysis of any situations that may require curtailment of groundwater withdrawal will be included in the report.
D1	Promote Water Conservation	<i>Emphasize Water Conservation Program:</i> The District will develop and sponsor a water conservation education curriculum, available upon request for all schools within the District. The District will utilize the methodologies listed under Goal 5 in order to raise public awareness of the necessity and importance of a water conservation program.	Annually report to the Board of Directors on: ♦ the number of schools where water conservation education curriculums are presented each year. ♦ the number of water conservation articles presented to the public via the various methodologies outlined in Goal 5. 4.1.b. Promote and/or implement groundwater banking, recharge projects, rainwater harvesting and aquifer storage and recovery projects, where appropriate and cost-effective, to address areas with declining groundwater levels. Promotion of these projects may be accomplished through articles published in at least one of the District's quarterly newsletters.
E1	Implementation of Public Relations and Educational Programs to Assist in Accomplishing Goals 1 through 4	<i>Produce and Disseminate Quarterly Newsletter:</i> Each year, 4 quarterly newsletters are produced for distribution to District constituents who request a free subscription, and other interested parties. Articles will strive to discuss methods to enhance and protect the quantity of usable quality ground water within the District.	Annually document number of newsletters published. Annually document the circulation of the newsletter during that year.

Appendix. Fayette Groundwater Conservation District			
E2		<i>Provide News Releases to District Media:</i> Each year, news releases discussing methods to enhance, conserve and protect the quantity of usable quality ground water are written and distributed to all print and electronic media within the District. This may also include radio public service announcements discussing methods to enhance, conserve and protect the groundwater.	Annually document number of news releases prepared and distributed to local and regional media detailing methods to enhance and protect the quantity and quality of usable ground water within the District.
E3		<i>Provide Public Information Boards at District Office:</i> Each year, the District makes well information, technical reports, brochures, and other printed information available to the public in the District office	Annually document the number of publications made available to the public via the information boards. Annually document the number of the items printed and/or photocopied for public distribution.
E4		<i>Provide Public Information Displays at Fairs/Meetings:</i> Each year, the District will place informative displays at regional fairs, farm shows, and professional meetings to address the protection and enhancement of usable quality groundwater in the District.	Annually document the number of the displays placed at regional fairs, farm shows, and professional meetings within the District's service area.
E5		<i>Offer Public Information Access via Internet:</i> The District will make information about water and water conservation available to the public via its home page on the Internet. This information will be continuously updated.	Annually document the number of "hits" the District web site receives.
E6		<i>Provide Classroom Presentations:</i> Upon request by instructors, District staff or Board members will assist area classrooms in presenting information about ground water quality, quantity, and water conservation to public school students. The District will make films and videos on a wide-range of water-related subjects available through the District office. Eventually, the District will develop a conservation education program and its accompanying curriculum in public and/or private schools within its service area.	Annually document the number of classroom presentations made or classroom and audio-visual materials provided. Annually document the names of participating schools and any feedback from students/teachers.
F1	Desired Future Conditions of the Aquifers within the Boundaries of the Fayette County Groundwater Conservation District	<i>Desired Future Conditions:</i> The Fayette County Groundwater Conservation District actively participates in developing the desired future conditions for the aquifers within the District's boundaries and within the boundaries of Groundwater Management Areas (GMAs) 12 and 15. The desired future conditions for the aquifers within GMAs 12 and 15 have not yet been established. Consequently, there are no Managed Available Groundwater estimates available to include in this Management Plan at this time. Therefore, this goal is not applicable to the District at this time. Once the desired future conditions are established, an estimate of the managed available groundwater will be determined. The District will amend the management plan at that time.	

Appendix. Gonzales Underground Water Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	Providing the Most Efficient Use of Groundwater	The District will register at least 20 exempt wells annually and will compile 100 percent of the data in a database within 30 working days.	Record the date and number of exempt wells registered annually, the percentage of exempt wells that were entered into the database, and the number of days before the data was entered.
A2		The District will measure water levels in 20 wells three times a year in western Gonzales County within the same 60 day period and will compile 100 percent of the water level data into a database within 30 working days.	Record the date and number of wells measured, the percent of collected water level data that was entered into the database, and the number of days before the data was entered.
A3		The District will measure water levels in 20 wells three times a year in eastern Gonzales County within the same 60 day period and will compile 100 percent of the water level data into a database within 30 working days.	Record the date and number of wells measured, the percent of collected water level data that was entered into the database, and the number of days before the data was entered.
A4		The District will meet with the cities of Gonzales, Nixon, Smiley and Waelder, at least once a year, to inform the cities on water availability for economic development. The District will provide input on 100 percent of requests for information within 30 days of the request.	Record the date and number of meetings with each city. Record number of requests for information from each city, the number of responses to each city, and the number of days required to respond to each request for information.
A5		The District will attend all Groundwater Management Area (GMA) 13 Meetings annually. The District will provide input on 100 percent of the requests for information within 30 days.	Record the number of GMA meetings posted annually, the number of GMA 13 meetings attended annually, the number of requests for information made by GMA 13, the number of responses to requests for information by GMA 13, the number of days required for each response to GMA 13 requests for information.

Appendix. Gonzales Underground Water Conservation District			
A6		The District will meet with the Gonzales Area Development Corporation (GADC), at least once a year, to inform the GADC on water availability for economic development. The District will provide input on 100 percent of requests for information within 30 days of the request.	Record the date and number of meetings with the GADC. Record the number of requests for information from the GADC, the number of responses given to the GADC, and the number of days required to respond to each request for information.
A7		The District will gather water production data from at least 4 public water suppliers annually and will compile 100 percent of these figures into a database of groundwater usage within 30 working days of receipt in order to better project the needs of the District.	Record the number of public suppliers from which water production data was collected annually, the percent of collected water production data that was entered into the database, and the number of days before the data was entered.
A8		The District will gather water production data from at least 10 irrigation wells and 5 livestock production facilities annually and will compile 100 percent of these figures into a database of groundwater usage within 30 working days of receipt in order to project future water use.	Record the number of irrigation wells and number livestock production facilities from which water production data was collected annually, the percent of collected water production data that was entered into the database, and the number of days before the data was entered.
B1	Controlling and Preventing Waste of Groundwater	The District will collect samples for water quality data in 20 wells annually at locations throughout the District during the same period every year and will compile 100 percent of this data into a water quality database within 30 working days of receipt. In selecting wells the District will emphasize the wells at or near the zone of bad water or potential pollution sources based on best available data.	Record the date and number of wells sampled annually, the location of the wells sampled, the percent of water quality data that was entered into the database, and the number of days before the data was entered.
B1	The District will monitor new facilities and activities on the recharge zones of the Carrizo/Wilcox, Queen City and Sparta aquifers on at least an annual basis for point source and non-point source pollution and compile 100 percent of this data into a pollution database within 30 working days from completion of the survey.		Record the date and results of visual survey of all recharge zones for point source and nonpoint source activities and facilities, the percent of available information that was entered into the database, and the number of days before the data was entered.
B3	The District will meet with the Railroad Commission at least once annually and coordinate its efforts with this agency in locating abandoned or deteriorated oil wells. The District will act on local complaints of abandoned or deteriorated oil wells within 30 days and compile 100 percent of the complaints and resulting District action in a database.		Record the date and number of meetings with the Railroad Commission annually. Record the date and number of complaints filed with the District annually, the time required to respond to each complaint, and the percentage of complaints entered into the database.

Appendix. Gonzales Underground Water Conservation District			
C1	Conjunctive Surface Water Management	The District will meet with the staff of the Guadalupe Blanco River Authority, at least once a year, to share information updates about conjunctive use potential.	Record the date and number of meetings with GBRA representatives annually.
D1	Addressing Natural Resource Issues	The District will meet with Natural Resources Conservation Service representatives to exchange information on wells and water levels at least once annually.	Record the date and number of meetings with the Natural Resources Conservation Service representatives annually.
D2		The District will meet with the local Railroad Commission of Texas engineering technician at least once annually to review oil well permits and oil related activity that could endanger the aquifers.	Record the date and number of meetings with the Railroad Commission engineering technician annually.
E1	Addressing Drought Conditions	The General Manager will access the National Weather Service – Climate Prediction Center website (http://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml) monthly to determine the Palmer Drought Severity Index and will submit a report to the Board of Directors monthly. The District will, 100 percent of the time when under extreme drought conditions, as defined by the Palmer Drought Severity Index, provide information to and coordinate with local water users and water managers regarding drought response activities.	Record the date and number of monthly reports made to the District Board of Directors. Record the date and number of times when the District was under extreme drought conditions and the number of times letters were sent to public water suppliers.
F1	Addressing Conservation, Recharge Enhancement, Rainwater Harvesting, Precipitation Enhancement, Brush Control	The District will publish an information article in a publication of wide circulation in the District, at least annually, describing conservation measures that can be taken by water users within the District.	Record date and number of conservation articles published annually.

Appendix. Gonzales Underground Water Conservation District			
F2		The District will publish an information article in a publication of wide circulation in the District, at least annually, describing recharge enhancement measures.	Record date and number of recharge enhancement articles published annually.
F3		The District will publish an information article in a publication of wide circulation in the District, at least annually, describing rainwater harvesting measures that can be taken by water users within the District.	Record date and number of rain water harvesting articles published annually.
F4		The District will publish an information article in a publication of wide circulation in the District, at least annually, describing current precipitation enhancement measures.	Record date and number of precipitation enhancement articles published annually.
F5		The District will publish an information article in a publication of wide circulation in the District, at least annually, describing brush control measures that can be used by landowners within the District.	Record date and number of brush control articles published annually.
G1	Transportation of Water from the District	The District will obtain monthly usage reports from individuals or entities that transport groundwater out of the District and will compile 100 percent of this data into a database within 30 working days of receipt.	Record the date and number of usage reports received from each individual or entity that transports groundwater out of the District, the percent of usage data that was entered into the database each month, and the number of days before the data was entered each month.

Appendix. Guadalupe County Groundwater Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	<i>Efficient Use of Groundwater</i>	District will establish a Carrizo-Wilcox aquifer water-level observation well program with a minimum of nine (9) observation wells. The nine observation wells will be measured twice annually, in January and September.	Number of times the wells are measured per year. The water level database will be maintained by the District office.
B1	<i>Controlling & Preventing Waste of Groundwater</i>	The District will once a year provide public information on closure of abandoned water wells and uncontrolled flowing wells through articles in local newspapers or the District's newsletter and website.	Number of times a year the District will address the proper closure of abandoned water wells and uncontrolled flowing wells in the local newspaper or the District's newsletter and website.
C1	<i>Conjunctive Use of Surface and Groundwater</i>	Each year the District will confer at least on one occasion with the Guadalupe-Blanco River Authority (GBRA) on cooperative opportunities for conjunctive resource management.	Number of meetings per year with GBRA on conjunctive resource management. A memo to document the meeting will be on file in the District's office.

Appendix. Guadalupe County Groundwater Conservation District			
D1	<i>Address Natural Resource Issues that Impact the Use and Availability of Groundwater</i>	Each year the District will evaluate all proposed new wells prior to drilling. Information submitted by the applicant will be evaluated in order assess water level impacts within the District.	A monthly report to the Board will be made on the results of all water level impact studies and number of wells evaluated each month.
E1	<i>Develop a Management Strategy to Address Drought Conditions</i>	District representative will attend 1 meeting of the South Texas Weather Modification Assn. Annually	Number of reports made to the board each year on the PDSI.
F1	<i>Conservation of Groundwater</i>	The District once a year will provide public information on water conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, and brush control through articles published in local newspapers or the District's newsletter and website.	Number of articles published in local newspapers or the District's newsletter and website each year. The articles will be on a five year rotating basis, so that at least one topic is covered each year.
G1	<i>Accurate Measurement of Rainfall</i>	The District has established a rainfall measurement system in the Guadalupe County Carrizo-Wilcox recharge area to obtain specific data on annual rainfall amounts.	The rainfall data will be saved and made public, and used in making management decisions. Data from the seven rainfall gauges will be reported to the Board each month. Number of times the data is reported to the board each year.
H1	<i>Desired Future Conditions</i>	The desired future conditions of the groundwater within the District have not yet been established in accordance with Chapter 36.108 of the Texas Water Code. The District is actively participating in the joint planning process and the development of a desired future condition for the portion of the aquifer within the District and the GMA area	
I1	<i>Methodology</i>	The District Manager will prepare an annual report on the District performances in achieving the management goals. The annual report will be presented to the Board of Directors during the first quarter of the calendar year. The report will include the number of instances each management activity was engaged in during the year. The annual report will be maintained on file at the District Office and made available to the public upon adoption by the Board.	

Appendix. Live Oak Underground Water Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	<i>Collection and maintenance of data on water quantity and quality</i>	a. Take measurements of depth to water level below the land surface on strategic wells on annual basis b. Take water samples for chemical analysis on strategic on an annual basis c. Reports annually, water quality and quantity data	Measure depth of water on 1 well annually measure chemical analysis of 4 wells annually.
A2		Measurement of pollution sources as wells: a. Identify wells that are polluted and take appropriate action b. Identify sources of pollution and take appropriate action c. Provide information to the public about wells that are polluted and the sources of pollution	Investigate 100% of complaints of well pollution annually
B1	<i>Efficient use of groundwater</i>	School education: a. Provide speakers to address water topics b. Distribute water resource education packets for use in the classroom	Contact teacher or principle of 1 school annually
B2		Farm education: a. Provide speakers to address water topics at farm meetings b. Distribute water resource education packets to farm leaders and farmers	Contact 1 farm group annually
B3		Home Education: a. Provide speakers to address water topics b. Distribute water resource education packets to community people	Contact 1 civic group annually

Appendix. Live Oak Underground Water Conservation District			
C1	<i>Conjunctive water management issues</i>	a. Attend meeting with surface water entities in the district, to include but not limited to; conjunctive use, emergency response, drought contingency planning b. Evaluate existing historical data and data derived from new monitoring programs to enhance understanding of aquifer/surface-water relationships c. Evaluate the impact of surface-water usage on groundwater resources within the District as needed. Provide comments regarding surface-water rights requests for those requests effecting the groundwater resources of the district d. Coordinate with other entities on regional planning efforts	District representative will attend 1 meeting with surface water entities annually. District representative will attend 1 meeting concerning regional water planning annually
D1	<i>Drought Conditions</i>	a. Participate in the South Texas Weather Modification Program b. Evaluate the performance of the weather modification program	District representative will attend 1 meeting of the South Texas Weather Modification Assn. Annually
E1	<i>Conservation</i>	a. Provide Information to area residents about water conservation b. Provide information to agriculture users about water conservation	Provide water conservation pamphlet to 1 district resident annually

Appendix. Lost Pines Groundwater Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	Provide the most efficient use of groundwater.	To inform the residents of Bastrop and Lee counties about the efficient use of groundwater. Such information may be related to irrigation efficiency, transmission losses, xeriscaping, or any other related subject deemed appropriate by the LPGCD board. The information on efficient use of groundwater may be disseminated in conjunction with information on controlling and preventing waste of groundwater and/or water conservation.	At least annually, the General Manager shall cause to be published in one or more newspapers of general circulation in Bastrop and Lee counties an article on efficient use of groundwater. The article on efficient use of groundwater may be published in conjunction with an article on controlling and preventing waste of groundwater and/or water conservation. In addition, to the extent practical, the LPGCD will sponsor or co-sponsor workshops open to the public that address this issue and similar issues.
B1	Controlling and preventing waste of groundwater.	To inform the residents of Bastrop and Lee counties about the waste of groundwater. Such information may be related to leaky or poorly functioning plumbing, transmission losses, xeriscaping, or any other related subject deemed appropriate by the LPGCD Board. The information on waste of groundwater may be disseminated in conjunction with information on efficient use of groundwater and/or water conservation.	At least annually, the General Manager shall cause to be published in one or more newspapers of general circulation in Bastrop and Lee counties an article on waste of groundwater. The article on waste of groundwater may be published in conjunction with an article on efficient use of groundwater and/or water conservation. In addition, to the extent practical, the LPGCD will sponsor or co-sponsor workshops open to the public that address this issue and similar issues.
C1	Address natural resource issues that impact the use and availability of groundwater and which are impacted by the use of groundwater.	To provide information to the public about the status of groundwater use, availability, and water levels and a description of natural resource issues, e.g., mining, out of District transport of groundwater, protection of endangered species, or the spread of phreatophytic vegetation, that impact the use and availability of groundwater or which are affected by the use and availability of groundwater.	At least annually, the General Manager shall prepare a report for the LPGCD board on the status of groundwater use, availability, and water levels within the District and a description of natural resource issues. Once this report is reviewed and accepted by the LPGCD Board, it shall be made available to the public at the District's office. In addition, the General Manager will cause a summary of the annual report to be published in one or more newspapers of general circulation in Bastrop and Lee counties. To the extent practical, the LPGCD also will sponsor or co-sponsor workshops open to the public that address this issue and similar issues.

Appendix. Lost Pines Groundwater Conservation District			
D1	Address drought conditions.	Drought conditions are to be addressed on an ongoing basis by tracking rainfall records available from nearby weather stations as compared to hydrographs for LPGCD monitoring wells. At least once per month, the General Manager will update rainfall and water level records maintained by the LPGCD. Based on GAM modeling and an understanding of the outcrop areas of the principal aquifers – Simsboro, Carrizo, Queen City, and Sparta – in the LPGCD, recharge appears to be relatively constant under the current climatic regime and little affected by drought conditions. It is anticipated, though that drought conditions will result in increased pumpage and decreased natural discharge, thereby affecting water levels in the aquifers.	At least annually, the General Manager shall prepare a report for the LPGCD board on precipitation amounts as compared to water levels within the District and a description of apparent trends. Once this report is reviewed and accepted by the LPGCD Board, it shall be made available to the public at the District’s office. In addition, the General Manager will cause a summary of the annual report to be published in one or more newspapers of general circulation in Bastrop and Lee counties. The summary may be published in conjunction with the publication of the summary of natural resource issues. In addition, to the extent practical, the LPGCD will sponsor or co-sponsor workshops open to the public that address this issue and similar issues.
E1	Address conservation of groundwater resources.	To educate the public within the District concerning water conservation. One or more articles related to advances in plumbing fixtures that conserve water and comparative cost savings of installing such fixtures, xeriscaping, or any other related subject deemed appropriate by the LPGCD board will be prepared for publication.	At least annually, the General Manager shall cause to be published in one or more newspapers of general circulation in Bastrop and Lee counties an article on conservation of groundwater. The article on water conservation may be published in conjunction with an article on efficient use of groundwater and controlling and preventing waste of groundwater. In addition, to the extent practical, the LPGCD will sponsor or co-sponsor workshops open to the public that address this issue and similar issues.
F1	Public Education	To inform the public about any and all matters related to the occurrence, distribution, behavior, and use of groundwater. To a degree, this management objective overlaps with all the required goals and management objectives described above; however, the focus of this management objective is on children.	At least once each year in each county of the LPGCD, the General Manager, assisted by other staff and consultants, as necessary, will present a program dealing with the above matters at a public school. The particular timing and age-level of such a program will be coordinated with the local school systems.

Appendix. Lost Pines Groundwater Conservation District			
G1	Drilling Permits	To review and evaluate all applications for drilling permits for exempt and non-exempt wells, not otherwise excluded and not existing prior to the date the District rules became effective.	At least once per year, notify all known water-well drillers operating in the District of the requirement for the prospective non-excluded well owner to obtain a drilling permit and the requirement that the driller insure that no new non-excluded well is drilled in the District without a permit. In addition, the General Manager shall cause to be published in one or more newspapers of general circulation in Bastrop and Lee counties an article related to the requirement to obtain drilling permits for non-excluded wells. Such an article may be combined with articles on other subjects published by the District.
H1	Register all wells within the LPGCD boundaries	To register all exempt wells drilled since the LPGCD Rules became effective and attempt to register all pre-existing exempt wells.	Registration of newly drilled exempt wells is accomplished by refunding the drilling permit fee upon submittal of completion reports, well logs, and well registration materials. The number of newly drilled wells will be documented in the annual report by the General Manager and in the LPGCD's database. Registration of pre-existing exempt wells is a more difficult issue, because registration of such wells is voluntary. Nevertheless, at least annually, the General Manager shall cause to be published in one or more newspapers of general circulation in Bastrop and Lee counties an article on registration of exempt wells. The article on registration of exempt wells may be published in conjunction with an article on controlling and preventing waste of groundwater, water use efficiency, and/or water conservation. In addition, the General Manager or his designated representative will note the existence of unregistered wells, spot the location of such wells on a map as best possible, and visit with the landowner, if possible, to encourage registration of the wells. Documentation of attempts to encourage registration of wells that were in existence prior to the effective date of the LPGCD Rules will be though notes made and kept on file at the District offices.

Appendix. Lost Pines Groundwater Conservation District			
II	Operating Permits	To review and evaluate all applications for operating permits for non-exempt wells, not otherwise excluded, within the LPGCD. In addition, the LPGCD will notify operating permit holders of the need to renew their operating permit at least sixty days prior to expiration.	At least once per year, notify all known water-well drillers and pump installers operating in the District of the requirement for the owner of a non-exempt well, not otherwise excluded, to obtain an operating permit and the requirement that the driller and/or pump installer insure that no non-exempt well, not otherwise excluded, is placed into service within the District without an operating permit. In addition, the General Manager shall cause to be published in one or more newspapers of general circulation in Bastrop and Lee counties an article related to the requirement to obtain operating permits for non-exempt wells, not otherwise excluded. Such an article may be combined with articles on other subjects published by the District.
J1	Transfer Permits	To review and evaluate all applications for transfer permits. Notify holders of transfer permits of the need to renew their transfer permit prior to expiration.	To complete administrative review of all permit applications and schedule for LPGCD consideration within sixty days of receipt.
K1	Timely processing of all drilling permits, operating permits and transfer permits	To complete administrative review of all permit applications and schedule for LPGCD consideration within sixty days of receipt	On an annual basis track the dates on which applications are received, the dates on which administrative review is completed, and the date on which the board considered applications. For any permit application taking longer than sixty days to process, record a brief comment in the files as to the reason for the delay. Provide an annual summary of the permit application tracking to the LPGCD board. Upon review and approval of the report, make it available for public review at the District office.

Appendix. Lost Pines Groundwater Conservation District			
L1	Maintain a Database.	To maintain a database of each drilling permit and registration of an exempt well, each drilling and operating permit for a non-exempt well, and each transfer permit. The LPGCD's intent is to be able to generate plots of the locations of each registered and permitted well, available completion information for the well, and to compute distances between the wells based on the most detailed coordinates in the data base.	The database will be constantly changing and evolving, as new data are acquired and entered into the database and as new or updated software and hardware become available. The overall performance standard is; Does it do what the LPGCD needs done? The measurable standard is an annual report prepared by the General Manager to the Board describing changes made to the structure and the content of the database and containing recommendations for additional changes and improvements. Once reviewed and accepted by the Board it shall be made available to the public at the LPGCD's office. In addition, the General Manager will cause a summary of the annual report to be published in one or more newspapers of general circulation in Bastrop and Lee counties. The summary may be published in conjunction with the publication of the summary of natural resource issues and drought conditions. In addition, to the extent practical, the LPGCD will sponsor or co-sponsor workshops open to the public that address this issue and similar issues.

Appendix. McMullen Groundwater Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	Providing the most efficient use of groundwater	Each year the District will provide education materials concerning the efficient use of groundwater.	Provide educational materials to at least one school annually.
B1	Controlling and preventing waste of groundwater	Measure water levels from the land surface on strategic wells on an annual basis and report waste to the District Board.	(a) Report to the District Board annually the number of water level measurements. (b) The District will investigate all reports of waste of groundwater within five working days. The number of reports of waste as well as the investigation findings will be reported to the District Board in the annual report.
C1	Natural Resource Issues	The District will cooperate with other interested parties and appropriate agencies to develop additional information on aquifer recharge.	A representative of the District will attend a meeting annually with interested parties and appropriate agencies.
D1	Drought Conditions	The District will monitor the Palmer Drought Severity Index (PDSI).	A report of the Palmer Drought Severity Index will be presented to the District board on an annual basis.
E1	Conservation	Each year the District will make available educational material to the public promoting conservation methods and concepts. The District will make at least one educational brochure available per year through service organizations, and on a continuing basis at the District office.	
F1	Precipitation Enhancement	The District will participate in the South Texas Weather Modification Program.	A district representative will attend a meeting of the South Texas Weather Modification Assn. annually.

Appendix. Medina County Groundwater Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	To Control and Prevent the Waste of Groundwater	Each year the District will provide at least one public service announcement concerning waste, which is prohibited under the District rule, to the newspapers and to the general public on at least six occasions.	(a) The District will furnish at least six newspaper articles and/or public service announcements on an annual basis. (b) The District will investigate all written reports of waste of groundwater within 24 hours.
B1	Addressing Natural Resource Issues That Impact the Use and Availability of Groundwater and Are Impacted by the Use of Groundwater	Each year the District will work with various interest groups and appropriate agencies, such as the San Antonio River Authority, to provide information on aquifer storage and recovery projects and will require permits for all aquifer storage and recovery projects.	(a) The District will require permits for all aquifer and storage projects within the District and report the number of applications submitted annually. (b) The District will provide one article to a newspaper of general circulation in the District regarding the San Antonio River Authority's Aquifer Storage and Recovery project.
B2		Each year the District will require issuance of a well construction permit prior to drilling all new wells.	Each year all well construction permits in compliance with the District rules will be issued within 15 working days. Well construction permits not in compliance will be considered at the next regular board meeting.
C1	Providing for the Efficient Use of Groundwater within the District	Each year, the District will provide informative speakers to schools and civic groups to raise public awareness of practices which ensure the efficient use of groundwater.	The District will make at least 2 public speaking appearances to promote the efficient use groundwater per year.
D1	Addressing Conjunctive Surface Water Management Issues	The District will attend 50% Of the regular meetings of the Region L Regional Water Planning Group and coordinate activities when requested by surface water management entities within the District.	The District will attend at least 50% of the regular meetings of the Region L Regional Water Planning Group and coordinate activities when requested by surface water management entities within the District. The District will report these activities annual in the District annual report to the Board of Directors.

Appendix. Medina County Groundwater Conservation District			
E1	Addressing Conservation	The District will annually submit an article regarding water conservation for publication to at least one newspaper of general circulation in Medina County.	A copy of the article submitted by the District for publication to a newspaper of general circulation in Medina County regarding water conservation will be included in the Annual Report to the Board of Directors.
F1	Addressing Drought Conditions	Each month, the District will download the updated Palmer Drought Severity Index (PDSI) map and check for the periodic updates to the Drought Preparedness Council Situation Report (Situation Report) posted on the Texas Water Information Network Web site www.txwin.net .	Quarterly, the District will make an assessment of the status of drought in the District and prepare a quarterly briefing to the Board of Directors. The downloaded PDSI maps and Situation Reports will be included with copies of the quarterly briefing in the District Annual Report to the Board of Directors.

Appendix. Mid-East Groundwater Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	Providing the most efficient use of groundwater.	The District will at least once annually conduct at least one program to provide public information and education to promote the efficient use of groundwater. Such programs may include newspaper publication, open meetings, handout brochures and mail-out brochures.	The District will document the number of times this activity was completed in the annual report to the Board of Directors and maintain a record of the above for subsequent audits.
B1	Controlling and preventing the waste of groundwater.	The District will at least annually conduct at least one program to provide public information and education of the prevention of the waste of groundwater. Such programs may include newspaper publications, open meetings, handout brochures and mail-out brochures.	The District will document the number of times this activity was completed in the annual report to the Board of Directors and maintain a record of the above for subsequent audits.

Appendix. Mid-East Groundwater Conservation District			
C 1	Addressing drought conditions.	The District shall call for the most efficient use of groundwater by all users in the District to maintain sufficient groundwater aquifer resources during periods of drought and for future resources by preventing waste and by regulation of users, if necessary to prevent depletion of the aquifers. The District will review the Texas Palmer Drought Index and the Texas Drought Preparedness Report, and monitor the District's production figures annually.	The District will document the number of times this activity was completed in the annual report to the Board of Directors and maintain a record of the above for subsequent audits.
D 1	Conservation.	The District will at least annually conduct a least one program to provide public information and education to promote the conservation of water. Such programs may include newspaper publication, open meetings, handout brochures and mail-out brochures.	The District will document the number of times this activity was completed in the annual report to the Board of Directors and maintain a record of the above for subsequent audits.

Appendix. Neches & Trinity Valleys Groundwater Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	PROVIDING FOR THE MOST EFFICIENT USE OF GROUNDWATER WITHIN	Each year the District will require the registration of all new wells drilled within the District's jurisdiction and the District will require a permit for drilling all non-exempt wells.	At all regularly scheduled Board meetings, the General Manager reports to the Board of Directors on the number of new wells registered with the District and the number of permit applications received and approved for new wells within the District.
A2		Each year the District will provide informative speakers to schools, civic groups, social clubs, and other organizations for presentations to inform a minimum of 50 citizens on the activities and programs, the geology and hydrology of groundwater, and the principles of water conservation relating to the best management practices for the efficient use of groundwater.	The number of citizens in attendance annually at District presentations concerning the principals of water conservation relating to the best practices for the efficient use of groundwater.
A3		Each year, on four or more occasions, the District will disseminate educational information relating to the conservation practices for the efficient use of water resources.	Number of occasions, annually, the District disseminated educational information relating to the conservation practices for the efficient use of water resources.
B1	CONTROLLING AND PREVENTING WASTE OF GROUNDWATER	100 percent of complete permit applications will be reviewed by the District within 90 days to ensure all procedures are followed to control and prevent the waste of groundwater. The District will report annually to the Board the number of permit application requests that met the District's rules and requirements for approval within 90 days of the receipt of the completed application.	1. Number of permits issued each year by the District for new non-exempt wells in compliance with District rules and procedures. 2. Percent of completed applications reviewed within 90 days of receipt of application.

Appendix. Neches & Trinity Valleys Groundwater Conservation District			
B2		The District will maintain procedures for the receipt of well permit applications. Annual reports will be made to the Board on the number and type of well permits approved. If no applications are received by the District during a reporting period, this will annually be reported to the Board.	The procedures for the receipt of well permit applications will be maintained in District files. An annual report will be made by the District to the Board on the number and type of well permits approved. If no well permit applications are filed and completed during the year, this will be reported to the Board.
C1	ADDRESSING DROUGHT CONDITIONS	The Board has adopted a contingency plan to cope with the effects of water supply shortages due to climatic or other conditions. The plan is reviewed at least annually by the Board. In developing the contingency plan, the District considered the economic effects of conservation measures upon all water resource user groups, the local implications of the degree and effect of changes in water storage conditions, the unique hydro-geologic conditions of the aquifer and the appropriate conditions under which to implement the contingency plan. During extreme drought conditions within the District as measured by the Palmer Drought Index, all efforts will be made to see that all municipalities and public water supply companies follow their drought contingency plans. During extreme drought conditions that materially affects the aquifer levels, the District staff will closely monitor the aquifer levels through establishment of a District monitoring plan of static levels in selected monitoring wells or by obtaining well water levels from selected water supply companies who have such data available to ensure that adequate quantities of water are available to the District and will coordinate with the Region C and I Water Planning Groups.	A drought contingency plan developed by the District and approved by the Board will be reviewed by the Board every year and revised as necessary. During extreme drought conditions within the District, efforts will be made through contact by District staff to see that municipalities and public water supply companies follow their drought contingency plans.
D1	ADDRESSING CONSERVATION, RECHARGE ENHANCEMENT, RAINWATER HARVESTING, PRECIPITATION ENHANCEMENT, OR BRUSH CONTROL	Each year, on four or more occasions, the District will disseminate educational information relating to the conservation practices for the efficient use of water resources.	Number of occasions, annually, the District disseminated educational information relating to the conservation practices for the efficient use of water resources.

Appendix. Panola County Groundwater Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	Providing the Most Efficient Use of Groundwater	Beginning in 2008, the District will require the registration of all wells within the District's boundaries each year.	The number of new and existing wells registered with the District will be provided in the Annual Report for each fiscal year.
A2		The District will require permits for all non-exempt groundwater use within District boundaries pursuant to the District Rules each year.	The District will accept and process applications for permits for all non-exempt groundwater use pursuant to the permitting process described in the District Rules each year. The Annual Report for each fiscal year will contain a summary of the number of applications for the permitted use of groundwater and the number and type of permits issued.
B1	Preventing Waste of Groundwater	<p>The District will provide information on an annual basis to the public on the elimination, reduction, and prevention of the waste of groundwater and information focused on water quality protection each year. The District will use one of the following methods to provide information to the public at least once during each fiscal year:</p> <ul style="list-style-type: none"> a. distribute literature packets or brochures within Panola County and the surrounding areas; b. provide public presentations on groundwater and water issues, including waste prevention; c. sponsor an educational program/course; d. provide information on the District's web site; e. submit newspaper articles to local paper for publication; f. present displays at local public events; or g. become involved in the distribution of information, such as brochures, in schools in Panola County. 	The District's Annual Report will include a summary of the District's efforts during the fiscal year to provide educational information to the public on the elimination, reduction and prevention of the waste of groundwater.

Appendix. Panola County Groundwater Conservation District			
B2		The District will make an annual evaluation of its Rules to determine whether any amendments are necessary to facilitate prevention of waste of the groundwater within District boundaries.	The District's Annual Report will include a summary of the evaluation of the District Rules and will provide a recommendation as to whether any amendments to the Rules are needed to facilitate prevention of waste.
C1	Addressing Conjunctive Surface Water Management Issues	The District will participate in the regional planning process by sending a representative to attend at least one meeting of the East Texas Regional Water Planning Group (Region I) each fiscal year.	The attendance at any Region I meeting by a representative of the District will be included in the District's Annual Report and will indicate the dates of attendance.
D1	Addressing Natural Resource Issues	The District will monitor water-levels within District boundaries on an annual basis by measuring the water level of at least 5 wells.	The District's Annual Report will include a description of the number of wells measured and the monitoring results of the measured well for each year.
E1	Addressing Drought Conditions	The District will download at least one updated Palmer Drought Severity Index ("PDSI") map each month and will check for the regular updates to the Drought Preparedness Council Situation Report ("Situation Report") posted on the following website: http://www.txdps.state.tx.us/dem/sitrepindex.html .	The District will include the 12 monthly downloaded PDSI maps and Situation Reports in the Annual Report for each fiscal year.
F1	Addressing Conservation, Recharge Enhancement, Rainwater Harvesting, Precipitation Enhancement, or Brush Control, Where Appropriate and Cost Effective	The District will promote conservation at least once during each fiscal year by one of the following methods: a. distribute literature packets or brochures; b. conduct public presentations; c. sponsor an educational program/curriculum; d. provide information on the District's web site; e. submit newspaper articles to local newspaper for publication; f. present displays at local public events; g. annually conduct a local contest on water conservation; or h. conduct classroom presentations on conservation.	The District's Annual Report will provide a summary of the District efforts and a copy of any information provided by the District to the public during the previous fiscal year to promote conservation.

Appendix. Panola County Groundwater Conservation District			
F2		The District will provide information relating to recharge enhancement on the District web site at least one time each fiscal year.	Each year, the District's Annual Report will include a copy of the information that has been provided on the District web site relating to recharge enhancement.
F3		The District will advocate rainwater harvesting each year by providing updated information about rainwater harvesting on the District web site at least once each fiscal year.	The Annual Report for the District will include a copy of the information on rainwater harvesting which has been provided on the District web site within the previous fiscal year.

Appendix. Pineywoods Groundwater Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	GROUNDWATER QUALITY PROTECTION MEASURES	Maintain a constant awareness of activities which may be or become a threat to the quality of groundwater and be prepared to adopt rules, resolutions, orders and/or directives to address the issue.	Annually review the Minutes of Board Meetings to determine if all water quality issues considered by the Board were addressed. This review will be included in the annual report to the Board of Directors.
B1	WASTE	Determine waste as defined in the Rules of the District and the Water Code and respond to reports of waste within 4 days.	Annually review all reported sources of waste, and if corrective actions were taken when warranted. A summary that includes the number of reports of waste and the number of days the District took to respond to each report of waste will be included in the annual report to the District Board of Directors.
C1	PROVIDING FOR THE MOST EFFICIENT USE OF GROUNDWATER	Each year, beginning in FY2002, the District will require the registration of all new wells drilled within the District's jurisdiction and the District will require a permit for all non-exempt wells, new and existing.	Each month at regularly scheduled meetings the General Manager reports to the District Board of Directors the number of new and existing wells registered with the District and the number of applications received for new wells within the District.

Appendix. Pineywoods Groundwater Conservation District			
D1	DROUGHT CONDITIONS	The District shall call for the most efficient use of groundwater by all users in the District to maintain sufficient groundwater aquifer resources during periods of drought and for future resources by preventing waste and by regulation of users, if necessary, to prevent depletion of the aquifers. To work closely with groundwater users and provide assistance where it is possible to control customer usage as it is outlined in their Drought Contingency Plans.	Periodically review the Texas Palmer Drought Index and the Texas Drought Preparedness Report, and monitor production figures quarterly. A summary of any drought conditions will be given to the Board of Directors in the annual report along with any recommendations and make necessary changes, as needed.
E1	WATER CONSERVATION PROGRAMS	Maintain a constant review of all projects to ensure that they are using the best available technology. Publish a newsletter at least quarterly and include some educational information to promote conservation. Provide public education at any opportunity to promote conservation.	Annually review all projects to determine if they are using best available technology and if educational materials are benefiting the conservation program. This review will be included in the annual report to the Board of Directors.
F1	INFORMATION	Publish current information and or reports in the newsletter and other local news media as they become available.	Annually verify that each edition of the newsletter contains current information and or reports about water conservation and waste prevention. This review will be included in the annual report to the Board of Directors.
G1	EDUCATION	Inform people about the benefits, goals, programs, duties and responsibilities of the District.	Annually review programs the District has provided or helped to provide which inform people about the goals, programs, duties and responsibilities of the District, and determine if more is needed and can be done to promote the District and its benefits. This review will be included in the annual report to the Board of Directors.
G2		Inform the cities and rural areas of the District about the benefits of providing conservation education to the schools through the newsletters and other correspondence.	Periodically review school education programs that cities and rural areas have began. This review will be included in the annual report to the Board of Directors.

Appendix. Plum Creek Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	Efficient Use of Groundwater	<p>1. The District will establish the PCCD Aquifer Water Level Observation Well Program with at least 6 observation wells located according to management zones within the District, and measure those wells at least once quarterly.</p> <p>2. The District will provide educational leadership to citizens within the District concerning this subject. The activity will be accomplished annually through at least one printed publication, such as a brochure, and public speaking at service organizations and public schools as provided for in the District's Public Education Program.</p> <p>3. The District will use its best efforts to obtain information on water being produced from areas in Caldwell County that are outside the boundaries of the District.</p> <p>4. The District will use its best efforts to obtain information on groundwater being produced from groundwater aquifers in counties surrounding the District as well as in areas close to the District that are not in groundwater districts to develop information about impacts of such production on groundwater in the District.</p>	<p>1. Establish the PCCD Aquifer Water Level Observation Well Program and its criteria, and begin quarterly measurements of at least 6 of the observation wells within one year following the adoption and certification of this plan.</p> <p>2. Water levels at these observation wells will be measured a minimum of once quarterly.</p> <p>3. PCCD representatives will circulate at least one publication and notice speaking appearances each year.</p> <p>4. PCCD representatives will attend and participate in GMA meetings appropriate to the District's regulatory authority.</p> <p>5. PCCD will periodically seek information from nearby groundwater districts not in the same GMA but drawing from the same aquifers regulated by the District.</p>
B1	Controlling and Preventing Waste of Groundwater.	The District will provide educational leadership to citizens within the District concerning this subject. The activity will be accomplished annually through at least one printed publication, such as a brochure.	A number of publications and speaking appearances by the District each year.
C1	Control and Prevent Subsidence	Subsidence is unlikely to occur in the Plum Creek Conservation District. The District historically has not experienced any subsidence. Accordingly, the District's Plan does not contain any "Management Objective" or related "Performance Standards" to address the issue of non-existent subsidence. Alluvium is poorly consolidated, but generally too thin to experience measurable (if any) subsidence due to groundwater withdrawals.	
D1	Conjunctive Use of Surface and Groundwater	Each year the District will confer at least once with the Guadalupe-Blanco River Authority (GBRA) and other local political subdivisions and water and wastewater utilities on cooperative opportunities for conjunctive resource management.	<p>1. The number of conferences with the GBRA, other political subdivisions and water and wastewater utilities, on conjunctive resource management each year.</p> <p>2. The District will continue to monitor progress of the Plum Creek Watershed Project.</p>

Appendix. Plum Creek Conservation District			
E1	Develop a Management Strategy to Address Drought Conditions	The District will develop and adopt a Drought Management Strategy Plan for groundwater under the authority of the District within five years of the adoption and certification of this plan, and thereafter review it annually, and revise it if necessary. The plan will be implemented when specified conditions require. After its adoption, the Board will periodically review and update the Plan based upon the availability of additional scientific data collected by or presented to the Board.	<ol style="list-style-type: none"> 1. Development and adoption of a Drought Management Strategy Plan within five years of the adoption and certification of this plan. 2. Review all of the conditions and requirements specified in the Drought Management Strategy Plan that would trigger implementation on an annual basis. 3. Determine the necessity of a program to monitor rainfall for timing of effects on groundwater availability during droughts.
F1	Address Natural Resource Issues That Impact the Use and Availability of Groundwater and Which are Impacted By the Use of Groundwater	<ol style="list-style-type: none"> 1. Each year the District will confer at least once with a representative of the Texas Railroad Commission (RCT) on the impact of oil and gas production or waste and disposal operations associated with oil and gas production on groundwater availability and quality, as well as the impact of groundwater production on the production of oil and gas in the District. 2. Also, during each year the District will evaluate all permit applications for new production injection or disposal wells permitted by the Railroad Commission, if any are filed, and the information submitted by the applicants on those wells prior to drilling, in order to assess the impact of these wells on the groundwater resources in the District. 	<ol style="list-style-type: none"> 1. The number of conferences with a representative of the Texas RCT each year; 2. The addition of available RCT well data to the District's database; 3. Monthly reports to the PCCD Board of Directors on the number of new well permit applications filed, and the possible impacts of those new wells on the groundwater resources in the District; and 4. Annual reports to the Board about consumption and use of groundwater for commercial purposes, including irrigation uses and enhanced oil and gas production when information is available.

Appendix. Plum Creek Conservation District			
G1	Conservation of Groundwater including Rainwater Harvesting, Brush Control, and/or Recharge Enhancement of Groundwater Resources in the District	<p>1. The District will provide educational leadership to citizens within the District concerning this subject. The educational efforts will be through at least one printed publication, such as a brochure produced either by the District or produced by others and made available by the District. Each of the following topics will be addressed in the publications:</p> <p>A. Conservation B. Rainwater Harvesting C. Brush Control</p> <p>2. The District will encourage and support projects and programs to conserve and/or preserve groundwater, and/or enhance groundwater recharge by annually.</p> <p>3. The District will evaluate the feasibility using Brush Control to enhance recharge within the District.</p> <p>4. The District will continue to sponsor and monitor development of the Plum Creek Watershed Project.</p>	<p>1. A number of publications by the District each year.</p> <p>2. The District staff will complete its investigation of the feasibility of using Brush Control to enhance recharge within the District and report its findings and recommendations to the Board.</p> <p>3. The staff will consider recommendations from and report to the Board on any recommendations of the Plum Creek Watershed Project upon completion of the Project.</p>
H1	Mitigation & Desired Future Conditions of Groundwater Resources	<p>1. Once the Desired Future Conditions of Groundwater Resources in the District have been established, the staff will then assess the need and benefit of adopting a mitigation plan for the District on an annual basis, with the first study to be completed within one year of the adoption and certification of this plan. Upon determining the need for a mitigation plan, the District will prepare a draft plan, seek public comment, hold appropriate hearings and adopt a plan for mitigation within one year of the assessment that finds a need for a mitigation plan. The plan will be reviewed on an annual basis thereafter. Possible practices for mitigation within the District would include producers funding projects that are included in a natural or artificial recharge plan adopted under the following paragraph 11, establishing fees to fund infrastructure in areas of the District in which groundwater was but is no longer readily available, and producers contracting to provide water to such areas at or near their cost</p>	<p>Review of groundwater resources in the District in comparison with the Desired Future Conditions of those resources once they are established and preparation of a recommendation for any mitigation actions within six (6) months following establishment of desired future conditions.</p>

Appendix. Plum Creek Conservation District			
II	Precipitation Enhancement	The District will assess the need and opportunity for precipitation enhancement in the District at least once every five years, with the first study to be completed within five years of the adoption and certification of this plan. Upon determining the need for precipitation enhancement, the District will adopt a plan for precipitation enhancement within two years of the assessment for the need for precipitation enhancement. The District will review that plan on an annual basis. Possible practices for precipitation enhancement in the District would be cloud seeding.	Annual evaluation and reports to the Board about the status of ongoing studies of the possibility of precipitation enhancement actions within the District to increase groundwater resources available in the District.
J1	Natural or Artificial Recharge Enhancement of Groundwater Within the District	The District will gather data to further the scientific understanding of recharge of the groundwater supplies within the District. The District will then assess the need and opportunity for recharge enhancement in the District at least once every five years, with the first study to be completed within five years of the adoption and certification of this plan. Upon determining the need for recharge the District will adopt a plan for natural and/or artificial recharge within two years of the assessment for the need of that recharge. The plan will be reviewed on an annual basis. Possible practices for recharge in the District would be Brush Management or construction of surface ponds in key recharge areas.	<ol style="list-style-type: none"> 1. Develop data relating to recharge, purifying and groundwater levels in the District. 2. Annually report to the Board on recharge data.

Appendix. Post Oak Savannah Groundwater Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	Efficient Use of Groundwater	The District will establish the POSGCD Aquifer Water Level Observation Well Program with at least 10 observation wells located according to management zones within the District, and measure those wells at least once annually.	Establish the POSGCD Aquifer Water Level Observation Well Program and its criteria, and begin measurements of at least 10 of the observation wells within one year following the adoption and certification of this plan. Number of observation wells measured annually by the District. Water levels at these observation wells will be measured a minimum of once annually.
A2		The District will provide educational leadership to citizens within the District concerning this subject. The activity will be accomplished annually through at least one printed publication, such as a brochure, and public speaking at service organizations and public schools as provided for in the District's Public Education Program.	The number of publications and speaking appearances by the District each year under the District's Public Education Program.
B1	Controlling and Preventing Waste of Groundwater.	The District will provide educational leadership to citizens within the District concerning his subject. The activity will be accomplished annually through at least one printed publication, such as a brochure, and public speaking at service organizations and public schools as provided for in the District's Public Education Program. The District will also offer at least one grant, during years when the District's revenues remain at a level sufficient to fund the program, to sponsor the attendance of students at summer camps/seminars that place emphasis on the conservation of water resources.	The number of publications and speaking appearances by the District each year, and the number of grants offered and students actually accepting and attending an educational summer camp or seminar.

Appendix. Post Oak Savannah Groundwater Conservation District			
C1	Conservation of Groundwater including Rainwater Harvesting, Precipitation Enhancement, Brush Control, and/or Recharge Enhancement of Groundwater Resources in the District	<p>The District will provide educational leadership to citizens within the District concerning this subject. The educational efforts will be through at least one printed publication, such as a brochure, and at least one public speaking program at a service organization and/or public school as provided for in the District's Public Education Program. Each of the following topics will be addressed in that program:</p> <ul style="list-style-type: none"> A. Conservation B. Rainwater Harvesting C. Brush Control 	The number of publications and speaking appearances by the District each year under the District's Public Education Program.
		<p>The District will offer to sponsor the attendance of at least one student at summer camps/seminars that place emphasis on the conservation of groundwater, groundwater recharge enhancement, or precipitation enhancement of water resources. The District will encourage and support projects and programs to conserve and/or preserve groundwater, and/or enhance groundwater recharge by annually funding the District's Groundwater Conservation and Enhancement Grant Program, during years when the District's revenues remain at a level sufficient to fund the program. The objective of this program is to obtain the active participation and cooperation of local water utilities in the funding and successful completion of programs and projects that will result in the conservation of groundwater and the protection or enhancement of the aquifers in the District. The qualifying water conservation projects and programs will include, as appropriate, projects that: result in the conservation of groundwater, reduce the loss or waste of groundwater, recharge enhancement, rainwater harvesting, precipitation enhancement, brush control, or any combination thereof. The District's objective is to benefit the existing and future users of groundwater in the District by providing for the more efficient use of water, increasing recharge to aquifers, reducing waste, limiting groundwater level declines, and maintaining or increasing the amount of groundwater available, by awarding at least one grant under the program in each county annually.</p>	

Appendix. Post Oak Savannah Groundwater Conservation District			
C3	The District will implement the POSGCD Well Closure Program. The objective of the well closure program is to obtain the closure and plugging of derelict and abandoned wells in a manner that is consistent with state law, for the protection of the aquifers, the environment, and the public safety. The District will conduct a program to identify, inspect, categorize and cause abandoned and derelict water, oil and gas wells to be closed and plugged, by annually funding the program or segments or phases of the program appropriate to be funded in such fiscal year. The District will fund the closure of at least one abandoned well during years when the District's revenues remain at a level sufficient to fund the program.		Annual funding, when applicable, for the District's Well Closure Program, and the number of wells closed and plugged as a result of the Well Closure Program.
E1	Conjunctive Use of Surface and Groundwater	Each year the District will confer at least once with the Brazos River Authority (BRA) on cooperative opportunities for conjunctive resource management.	The number of conferences with the BRA on conjunctive resource management each year.
F1	Develop a Management Strategy to Address Drought Conditions	The District will develop and adopt a Drought Management Strategy Plan within five years of the adoption and certification of this plan, review it annually, and revise it if necessary. The plan will be implemented when specified conditions require.	Development and adoption of a Drought Management Strategy Plan within five years of the adoption and certification of this plan.
G1	Address Natural Resource Issues That Impact the Use and Availability of Groundwater and Which are Impacted By the Use of Groundwater	Each year the District will confer at least once with a representative of the Railroad Commission of Texas (RCT) on the impact of oil and gas production on groundwater availability, as well as the impact of groundwater production on the production of oil and gas in the District.	The number of conferences with a representative of the Texas RCT each year.
G2		Also, during each year the District will evaluate all permit applications for new wells, if any are filed, and the information submitted by the applicants on those wells prior to drilling, in order to assess the impact of these wells on the groundwater resources in the District.	Monthly reports to the POSGCD Board of Directors on the number of new well permit applications filed, and the possible impacts of those new wells on the groundwater resources in the District.

Appendix. Post Oak Savannah Groundwater Conservation District			
H1	Mitigation	The District will assess the need and benefit of adopting a mitigation plan for the District on an annual basis, with the first study to be completed within one year of the adoption and certification of this plan. Upon determining the need for a mitigation plan, the District will prepare a draft plan, seek public comment, hold appropriate hearings and adopt a plan for mitigation within one year of the assessment that finds a need for a mitigation plan. The plan will be reviewed on an annual basis thereafter. Possible practices for mitigation within the District would include producers funding projects that are included in a natural or artificial recharge plan adopted under the following paragraph 11, establishing fees to fund infrastructure in areas of the District in which groundwater was but is no longer readily available, and producers contracting to provide water to such areas at or near their cost.	
I1	Precipitation Enhancement	The District will assess the need and opportunity for precipitation enhancement in the District at least once every five years, with the first study to be completed within five years of the adoption and certification of this plan. Upon determining the need for precipitation enhancement, the District will adopt a plan for precipitation enhancement within two years of the assessment for the need for precipitation enhancement. The District will review that plan on an annual basis. Possible practices for precipitation enhancement in the District would be cloud seeding.	
J1	Natural or artificial Recharge Enhancement of Groundwater Within the District	The District will assess the need and opportunity for recharge enhancement in the District at least once every five years, with the first study to be completed within five years of the adoption and certification of this plan. Upon determining the need for recharge the District will adopt a plan for natural and/or artificial recharge within two years of the assessment for the need of that recharge. The plan will be reviewed on an annual basis. Possible practices for recharge in the District would be Brush Management or construction of surface ponds in key recharge areas.	

Appendix. Rusk County Groundwater Conservation District			
	Goal	Management Plan Objectives	Performance Standard
A1	Efficient Use of Groundwater	The District will require all new exempt or non-exempt wells that are constructed within the boundaries of the District to be registered with the District in accordance with the District rules.	Issue permits within 20 days of application. Each Year the number of exempt and non-exempt wells registered by the District for the year and a list of any permits that were not issued within 20 days with the cause and corrective action taken, will be incorporated into the Annual Report submitted to the Board of Directors of the District.
A2		Establish a Groundwater Database for all water wells in the District. The database shall include information relating to well location, production volume, and other information deemed necessary by the District to enable effective monitoring of groundwater in Rusk County.	Document all new and existing wells by 2010. Each Year the number of new and existing groundwater wells added to the database will be presented in the Annual Report submitted to the Board of Directors of the District.
A3		Provide Public Education Opportunities.	Disseminate educational information regarding the hydro-geologic cycle and status of aquifers through at least two articles in Rusk County newspapers, posting on the District internet website, and as needed responses to public inquiries. The Annual Report to the Board of Directors of the District will reflect educational achievements through newspaper articles, the number of hits on the Districts web site, and the number of responses to public inquiries annually.

Appendix. Rusk County Groundwater Conservation District			
B1	Minimize Waste of Groundwater	Public Education	The District will provide educational leadership to the citizens of the District concerning this subject through at least one printed publication per year, public speaking at least once per year at service organizations or public schools, and wasteful practices posted on the Districts internet website. Each Year the number of publications and speaking appearances by the District each year will be presented in the Annual Report submitted to the Board of Directors of the District
B2		Identify wasteful practices.	<p>a) Write and adopt rules to regulate wasteful practices by December 2008. b) Track Water Quality Issues. c) Initiate a District wide program to identify the location of all abandoned wells by January 2010. d) Develop and adopt guidelines, setting forth the period of time allowed, for abandoned well owners to insure voluntary compliance with Texas Water Code well plugging requirements by January 2010. e) Report unplugged abandoned water wells to the well owners and Board within thirty (30) days of discovery.</p> <p>a) Hold public hearing on proposed rules to regulate wasteful practices by December 2008. b) Report achievements in the District's Annual Report. c) Provide TECQ and TWDB an annual status report on unplugged abandoned water wells beginning in 2010.</p>

Appendix. Rusk County Groundwater Conservation District			
C1	Conjunctive Surface Water Management Issues.	The District will actively participate with Municipal and County Governments to encourage the development of additional surface water sources for Rusk County.	Selected board members will attend at least one planning meeting per year with municipal and county government groups addressing surface water options. Each Year, the progress made by Municipal and County Governments will be submitted to the Board of Directors in the Annual Report on advancements made toward increasing surface water availability and reduction of demand on the aquifers in the county.
C2		Coordinate conjunctive surface water issues with the East Texas Regional Water Planning Group.	The District will participate in the regional planning process by attending at least 50% of the East Texas Regional Water Planning Group meetings per year. A report will be made by the board's representative at each board meeting of the Rusk County Groundwater Conservation District, updating the Board on conjunctive surface water issues being discussed by the ETRWPG.
D1	Addressing Drought Conditions	The District will develop and adopt a Drought Contingency Plan for the Rusk County Groundwater Conservation District within one year of the adoption and certification of this plan, review it annually, and revise it if necessary.	A contingency plan to cope with the effects of water supply shortages due to climatic or other conditions will be developed by the District and will be adopted by the Board after notice and hearing. In developing the contingency plan, the District will consider the economic effects of conservation measures upon all water resource user groups, the local implications of the degree and effect of changes in water storage conditions, the unique hydro geologic conditions of the aquifer and the appropriate conditions under which to implement the contingency plan. a) Development and adoption of a Drought Contingency Plan within one year of the adoption and certification of this plan. b) The Annual Report to the Board of Directors of the District will reflect any implementations of the Drought Contingency Plan in that year. The report will include an appraisal of the plans effectiveness and suggestions for revisions to the plan.

Appendix. Rusk County Groundwater Conservation District			
E1	Addressing Conservation	Public education on groundwater conservation.	The District will issue at least two articles per year in Rusk County newspapers and on the District internet website regarding water conservation issues applicable to the residence of Rusk County. Copies of the articles posted on the District website regarding groundwater conservation will be included in the Annual Report to the Board of Directors.
F1	Total Usable Amount of Groundwater	The total usable amount of groundwater for the Carrizo-Wilcox Aquifer located in Rusk County shall be “Near Sustainability,” which is a reasonable and attainable goal for the residents of Rusk and the surrounding counties. Near Sustainability is defined as allowing up to an average drawdown of the aquifer between 2010 and 2050 not to exceed 10 feet. This objective is based on the Texas Water Development Board’s (TWDB) Groundwater Availability Model (GAM) and other applicable and available data analyzed by LBG-Guyton Associates and Hydrex Environmental, using the best available science. The District recognizes that the GAM is a model and may be based on inaccurate and/or out of date assumptions. The district reserves the right to adjust its total usable amount of groundwater based on new data, as it is available. By allowing up to an average drawdown of up to 10 feet, the aquifer will sustain increased groundwater withdrawal of up to 10,000 af/yr. Currently, the estimated amount of groundwater pumped within Rusk County annually is 7,963 acre-feet.	<p>The RCGCD has contracted with Hydrex Environmental to increase the aquifer monitoring program from 15 sites within the county to approximately 100 sites. Aquifer levels will be monitored at least quarterly for all additional sites. Aquifer levels will be evaluated against recorded precipitation within the county. If the average drawdown of the aquifer in Rusk County exceeds 8 feet for more than two consecutive months the District will implement the Drought Contingency Plan (DCP). The DCP will be lifted after the average aquifer level drawdown is less than 8 Feet for two consecutive months. If the average drawdown of the aquifer in Rusk County exceeds 10 feet for more than two consecutive months, issuance of non-exempt permits will be halted until the average aquifer drawdown is less than 8 feet for two consecutive months.</p> <p>a) Establish additional aquifer level monitoring sites by the end of 2008.</p> <p>b) Set the average aquifer level for the County from the data gathered by January 2010. c) Publish the data gathered on the districts web site quarterly beginning in 2009.</p> <p>d) Share this data with the TWDB annually.</p> <p>e) Report average quarterly aquifer levels in the annual report to the Board of Directors.</p>

Appendix. Uvalde County Groundwater Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	To Control and Prevent the Waste of Groundwater	Each year the District will provide education materials concerning waste, which is prohibited under the District rule, to the newspapers and to the general public on at least six occasions	(a) The District will provide to a newspaper of general circulation within the District at least six newspaper articles and/or public service announcements on an annual basis, including those that may be posted on the District's Web site. (b) The District will investigate all written reports of waste of groundwater within five working days from the date the report is filed with the District.
B1	Addressing Natural Resource Issues that Impact the Use and Availability of Groundwater and Are Impacted by the Use of Groundwater	Each year the District will cooperate with interested parties and appropriate agencies to develop additional information on aquifer recharge and weather modification projects.	(a) The District will establish terms for all aquifer recharge, transportation, or storage project permits. The District shall take into consideration all applicable factors and requirements of the District's rules and state law. (b) The District will make all information available to the District on such projects available to the general public and to permit applicants annually. (c) The District shall require owners or operators of all aquifer pumping, recharge, transportation, or storage projects affecting the district to obtain a permit amendment if the use, volume of groundwater pumped, location of, or means of transportation, recharge, or storage changes from the manner in which it was originally permitted.
B2		The District will require issuance of a well construction permit, or preregistration of exempt wells not requiring a construction permit, prior to the drilling of all new wells for all aquifers under the District's jurisdiction.	All well construction permits in compliance with the District rules will be issued within 20 days. Well construction permits not in compliance with the rules, as determined by the General Manager, will be considered at the next regular board meeting, but within 90 days of the General Manager's determination of the application's compliance with District rules.

Appendix. Uvalde County Groundwater Conservation District			
C1	Providing for the Efficient Use of Groundwater within the District	Each year the District will make available educational brochures to the public promoting and explaining conservation methods and concepts, on at least one occasion.	The District will make educational material available at least one time per year through service organizations, and on a continuing basis at the District Office.
C2		Each year, the District will provide informative speakers to school and civic groups to raise public awareness of practices that ensure the efficient use of groundwater.	Each year, the District will make at least two public speaking appearances to promote the efficient use of groundwater.
D1	The Control and Prevention of Subsidence	The geologic framework of the District Area precludes any significant subsidence from occurring. This management goal is not applicable to the operations of the District.	
E1	Addressing Conjunctive Surface Water Management Issues	Except as provided in Chapter 36 of the Texas Water Code, the District has no jurisdiction over surface water. The District shall consider the effects of surface water resources as required by Section 36.113 and other state law.	
F1	Addressing Conservation	The District will annually submit an article regarding water conservation for publication to at least one newspaper of general circulation in Uvalde County.	A copy of the article submitted by the District for publication to a newspaper of general circulation in Uvalde County regarding water conservation will be included in the Annual Report to the Board of Directors.
G1	Addressing Drought Conditions	Each month, the District will download the updated Palmer Drought Severity Index (PDSI) map and check for the periodic updates to the Drought Preparedness Council Situation Report (Situation Report) posted on the Texas Water Information Network website www.txwin.net .	Quarterly, the District will make an assessment of the status of drought in the District and prepare a quarterly briefing to the Board of Directors. The downloaded PDSI maps and Situation Reports will be included with copies of the quarterly briefing in the District Annual Report to the

Appendix. Wintergarden Groundwater Conservation District			
#	Goal	Management Plan Objectives	Performance Standard
A1	<i>Efficient Use of Ground Water.</i>	District will continue monitoring and recording data from the five (5) Carrizo Aquifer well/monitors.	The District will assimilate data from the aquifer water level monitors and present to the Board monthly.
B1	<i>Controlling and Preventing Waste of Groundwater.</i>	The District will at least on two (2) occasions each year provide public information on water conservation and waste prevention through public speaking appearances at public schools, and civic organizations or newspaper articles.	A. The number of speaking appearances made by the District each year. B. The number of newspaper articles published by the District each year.
C1	<i>Address Conjunctive Surface Water Management Issues.</i>	Each year the District will confer at least on one occasion with the Nueces River Authority on cooperative opportunities for conjunctive resource management.	The number of conferences on conjunctive resource management opportunities held with Nueces River Authority each year.
D1	<i>Address Natural Resource Issues that Impact the Use and Availability of Groundwater.</i>	Each year the District will insure that all new wells permitted for construction within the District, comply with the District construction standards through monitoring of the State of Texas water well report required to be provided to the District by water well drillers.	The number of newly permitted water wells within the District monitored for compliance will be reported to the Board annually.
D2	<i>Address Natural Resource Issues that Impact the Use and Availability of Groundwater.</i>	Each year the District will insure that all new wells permitted for construction within the District, comply with the District construction standards through monitoring of the State of Texas water well report required to be provided to the District by water well drillers.	The number of newly permitted water wells within the District monitored for compliance will be reported to the Board annually.
E1	<i>Conservation, Recharge Enhancement, Rainwater Harvesting, Precipitation Enhancement, Brush Control, Where Appropriate and Effective.</i>	The District, in partnership with the Texas A & M Research Center, Uvalde, Texas, will maintain and provide a Weather Station centrally located in the District.	Hourly and average daily temperatures are available as a Precision Irrigation Network online at http://uvalde.tamu.edu/pet/ to prescribe daily irrigated crops use/need for precipitation.

Appendix. Wintergarden Groundwater Conservation District			
E2		The District will monitor existing recharge structure and evaluate how natural or artificial recharge may be increased for the groundwater resources within the District via the existing structure and/or new sites.	The number of recharge sites monitored will be at least one site annually. The number of acre feet of captured rainwater in the recharge pit will be documented and reported to the Board of Directors annually.
E3		The District will participate in and manage the Southwest Texas Rain Enhancement Association cloud seeding project for eight months of each calendar year with five counties (Dimmit, La Salle, Uvalde, Webb, and Zavala Counties) in the target area. The project will be for precipitation increase and groundwater conservation. The project is also involved in hail suppression.	The Southwest Texas Rain Enhancement Association annual report will be provided to the Board as well as anyone interested by January 31 of the following year. The day-to-day (each mission) reports are also available next day to the Board of Directors and any interested individual.
E4		Brush Control – Recharge Enhancement and Conservation Project in partnership with the Texas A & M Research Center, Uvalde, Texas, in La Salle County.	Four (4) sites consisting of a control (no treatment – root plowed) freshly treated site – 5-year post treated, and 15-year post treated sites will be instrumented and data collected biweekly as to moisture depth and penetration and retention in relation to woody vegetation. Periodic updates will be forwarded to the Board of Directors and kept on file along with an annual report at the close of the project year. At the end of the project, data will be published in a scientific, peer-reviewed journal.
F1	Drought Contingency Plan	Each month the District will download the Palmer Drought Severity Index (PDSI) map and check the updates to the Drought Preparedness Council Situation Report posted on the Texas Water Information Network website www.txwin.net .	As required, the staff will assess the status of drought in the District and when needed, prepare a briefing with maps and situation reports for the Board of Directors. Monthly downloads will be filed for future use.
G1	Desired Future Condition	The District in conjunction with neighboring districts within our Groundwater Management Area will utilize the planning committee to develop the Desired Future Conditions of the aquifer.	This goal is not applicable to the District at the time of plan adoption.

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